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ABSTRACT

The proceedings of a July 1989 conference of directors of research grants and research-based contracts funded by the Division of Innovation and Development of the Office of Special Education Programs are presented. The meeting featured a combination of general sessions, small-group discussions on research issues and content areas, and a panel discussion on individual differences in special education. In a speech titled "Prevention, Intervention, and Understanding of Conduct Problems of Children and Adolescents," John Reid reviews trends in 20 years of research into antisocial child behavior at the Oregon Social Learning Center in Eugene. In "Understanding and Selecting Designs for Research in Naturally-Occurring Situations," Evelyn Jacob provides a rationale for focusing on the goals and assumptions of research designs, explores assumptions and goals of alternative research designs, and offers guidelines for choosing among alternatives. Lynn Fuchs, in an introduction to a panel discussion, examines "The Importance of Individual Differences to Special Education Effectiveness." Other panel presentations include: "Individual Differences and the Form and Function of Instruction" (Alan Hofmeister); "Aptitude-Treatment Interactions: Bad Rap or Bad Idea?" (Deborah Speece); and "Individual Differences and the Individual Difference: The Essential Difference of Special Education" (Stanley Deno). Also included is the conference agenda. About 165 references are cited. (DB)

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PROCEEDINGS

Research in Education of the Handicapped

Project Directors' Meeting

July 12–14, 1989

Hosted by the
ERIC/OSEP Special Project on
Interagency Information Dissemination, the ERIC
Clearinghouse on Handicapped and Gifted Children

The Council for Exceptional Children

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INTRODUCTION

On July 12-14, 1989, the Office of Special Education Programs of the U. S. Department of Education held its fourth annual Research Project Directors' Conference. Each year the directors of research grants and research-based contracts funded by the Division of Innovation and Development are invited to attend this meeting. OSEP instituted this annual researchers' conference in order to strengthen communication within the research community and to provide individual researchers with an opportunity to view the research process from a wider, more integrated perspective.

The conference is planned by a committee of senior researchers nominated at the close of each year's meeting. The 1989 meeting was planned by Lynn Fuchs, Vanderbilt University (Committee Chair); Richard Brinker, University of Illinois at Chicago; Robert Horner, University of Oregon; and Robert Gaylord-Ross, San Francisco State University.

The 1989 meeting featured a combination of general sessions, small-group discussions on a variety of research issues and content areas, and a panel discussion that explored the importance of individual differences in special education. This proceedings includes copies of the speeches given by John B. Reid and Evelyn Jacob; the introduction to the panel discussion by panel moderator Lynn Fuchs and the presentations of panel members Alan Hofmeister, Deborah Speece and Stanley Deno.

Planning for the 1990 conference has already begun, based on the evaluations of the 1989 conference. We look forward to another successful year.

Kathleen McLane
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The Council for Exceptional Children

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PREVENTION, INTERVENTION AND UNDERSTANDING OF CONDUCT PROBLEMS OF CHILDREN AND ADOLESCENTS

John B. Reid
Oregon Social Learning Center
Eugene, Oregon

Prevention, Intervention and Understanding of Conduct Problems of Children and Adolescents

John B. Reid

Oregon Social Learning Center

Eugene, Oregon

"Let our practice dictate our doctrine, thereby assuring precise theoretical coherence"

(Abbey, 1975, p. 71)

When Marty Kaufman and Rob Horner approached me to give this talk, I was honored, but somewhat puzzled about why I should be asked to address a group of experienced and senior investigators in the field of educational research. Over the last 20 years our group at the Oregon Social Learning Center (OSLC) has been conducting basic and clinical research on antisocial behavior of children and adolescents. Although some of the work has been carried out in school settings, I have never thought of our research as being very central to research dealing with students and teachers. After talking to Marty and Rob, it turns out they thought the content of our work would be of interest to some of you, in that antisocial child behavior is a critical issue for educators. But of more interest to them was that the way we do our research has gradually changed over those 20 years. In the 1960s, we started with a highly specialized methodology (direct observation in quasi-natural settings),

theoretical orientation (Skinner), and analytic stratety (single case study, sometimes ANOVA). At present, we use a multimethod assessment methodology, borrow from a range of theories, and use a number of analytic strategies to study antisocial behavior. Basically, Kaufman and Horner wanted me to share with you our experiences during these transitions (and maybe share a little data as well). Before I begin, it should be noted that I serve as a spokesperson for a group of investigators with whom I work. Gerald Patterson is the leader of our group, and he trained most of us. Others who have been central in our research program are Lew Bank, Patricia Chamberlain, Tom Dishion, Beverly Fagot, Marion Forgatch, and Kate Kavanagh. Hill Walker is the chairperson of our Board of Directors, collaborates with us, and has taught us most of what we know about antisocial behavior in the school setting.

The set of research questions that forms the core of our research is continuously evolving--which is why our methodology keeps getting more diverse--but it has to do with understanding, preventing, and intervening in the development of antisocial behavior and conduct problems. When we began studying this set of questions in the early 1960s, we were concerned only with the oppositional behavior of young kids in a limited number of settings (mainly the home, sometimes at school) that involved aggressive interaction with parents and siblings. We were clinical psychologists and our interest was in developing techniques to help young children and their families who were referred for conduct problems.

Initially we weren't concerned with developmental issues, or even with across-setting generalization. The initial task was to start developing ways to measure the oppositional/non-compliant/aggressive child behavior about

which the parents were complaining. We wanted to measure it in the home, because that was where the action seemed to be. Because of our early Skinnerian orientation, we distrusted questionnaire, child and parent report data. We first developed observational coding systems for children, most of whom were preschoolers. Because our intervention model was based on operant conditioning, we soon developed coding categories for parental reactions to the child's behavior, and kept track of the sequential order of the behaviors as well. Using a rather simple observational strategy, we were able to get quantifiable and reliable measures of child conduct problem behavior which differentiated referred from non-referred children (Reid, 1978). We were also able to use the observational methodology to show functional relationships between parent and child behavior that were useful in designing parent training strategies (Patterson, 1982). Those data also showed that the referred children demonstrated about twice the rates of aversive behavior as their normal counterparts, and that their parents were highly aversive, as well. The reactions of these parents to their children were both highly aversive and less contingent; their attempts to discipline led to failure about twice as often as attempts by normal control parents. (Reid, 1986 ; Taplin & Reid, 1977).

By systematically teaching such parents to track key behaviors, to consistently reinforce the positive, and to ignore or use time out for the negative behaviors, the conduct of most of the children we treated changed visably and significantly for the better (e.g., Patterson & Reid, 1973; Patterson & Fleishman, 1979). We were quite content with our research and clinical strategies through the middle 1970s. The only significant changes

were made to appease others. As one example, we developed an "observer impression" measure at the insistence of our observers. They were convinced that our observation codes were missing important information about molar variables that could not be recorded with the microsocial coding system, such as parental hostility and family chaos. The observers suggested a global rating system that could be used immediately after each home observation. We didn't even analyze those data until the late 1970s, and they turned out to be of tremendous value. The scores correlated well with the observation data, and accounted for unique variance when used with baseline microsocial data to predict treatment outcome (Weinrott, Reid, Bauske, & Brummett, 1981). We now use that procedure regularly in testing our theoretical models (e.g., Patterson, 1986).

Another example of adding a measure at the insistence of others was our use of a parent treatment satisfaction measure. When Patterson and I tried to publish our second outcome study, which analyzed the effectiveness of parent training for a group of consecutive referrals (Patterson & Reid, 1973), the editorial referees would not accept the paper unless we collected self-report data from parents on the effectiveness of the treatment. This was quite threatening (and repulsive to us at the time) because we had little faith in such soft and potentially reactive data. We quickly devised a seven-item instrument, called our subjects, and had them do the ratings. To our pleasant surprise, virtually all the parents gave the treatment high ratings, and the study was published. We now use such data routinely in our treatment studies. It's interesting how one can get over a negative bias toward a measurement strategy when it produces data consistent with one's model!

Conduct Problems

During the early 1970s, we were forced to develop a measure on the basis of our own findings. We found that, in addition to the easily observable conduct problems of young children such as direct noncompliance, hitting, yelling, and the like, our preschool oppositional youngsters demonstrated low baserate, often covert, but troublesome behaviors that were impossible to observe with our coding systems. Some examples were lying, running away, stealing, enuresis, and firesetting. Our solution was a parent daily report instrument (e.g., Patterson & Reid, 1973; Chamberlain & Reid, 1987) that was administered every other day for two-week intervals before, during, and after treatment. The instrument correlated well with our observational data (e.g., Reid, 1978), yielded similar treatment outcome data (Patterson & Fleishman, 1979), and taught us that our early treatment was not as good as we thought it was. In the early 1970s, we found that about a third of our clients were not profiting to a significant extent from our treatment--and those failures were the families of children who stole and lied at high rates.

We began a series of studies of young chidren, referred because of stealing, and failed miserably with our first 10 pilot cases. The parents of these kids seemed only peripherally involved in the day-to-day activities of their youngsters, did not adequately supervise or monitor their activities, and did not consistently show up for appointments. They usually were referred because the behavior of their children was upsetting to other people (e.g., teachers, neighbors) who pressured them to seek treatment. Their treatment motivation tended to diminish markedly after they made the first appointment. A simple parent training paradigm was not sufficient for these clients. We had to spend time inducting these families into treatment, dealing with

general parenting issues, teaching them the importance of keeping track of their children's activities, and teaching them monitoring skills. Basically, we found that if we spent time developing a relationship with such parents, teaching them the basic tracking, reinforcement, and discipline skills and, in addition, teaching them to keep track of the youngsters' out-of-home activities, then it was possible to reduce the stealing behavior (Reid & Patterson, 1976).

As our clients forced us to broaden our definition of antisocial behavior to include clandestine behaviors that often occurred outside the home, we had to broaden our assessment strategy if we wanted to extend our knowledge of antisocial behavior and of its treatment. Our data were forcing changes in how we measured and thought about the phenomena. We were beginning to see poor parental monitoring as critical in this antisocial process; we were becoming aware that we would have to extend our field of study outside the home; and we were beginning to fully appreciate the pressures on some families that interferred with their ability to properly parent their children.

During the mid-and late 1970s, we extended our treatment studies to include preadolescent children and continued to experience some success in reducing antisocial behavior. However, we had to broaden the content of our treatment approach to include increasing emphasis on strategies such as monitoring, behavioral contracting, and problem solving; and to broaden our conceptualization of the treatment process to emphasize increased therapist soft skills, dealing directly with client resistance, and to deal with such background issues as marital conflict and parental depression.(see Patterson, 1985).

Conduct Problems

One line of research that we initiated in the late 1970s, but that I'm not going to go into today, was the study of resistance in the treatment of families of antisocial children. We have spent a good deal of energy in developing observational codes of therapy behavior and are beginning to understand some of the behaviors of therapists that lead to increased and decreased rates of resistance by parents (see Patterson & Chamberlain, 1988; Chamberlain & Ray, 1988).

A critical turning point in our research methodology and development of theoretical models came as a result of conducting a treatment study that was completed in the early 1980s. We had decided that we knew enough about the treatment of antisocial behavior to tackle multiple-offending teenage delinquents by working with their parents. We designed a randomized experiment, treated 25 delinquents and turned 25 back to the family services of the juvenile court as a control group. Our main measures of treatment outcome and persistence effects were arrests and amount of time spent incarcerated before, during, and for 3 years following treatment. In a nutshell, we found that our treatment outperformed the control condition in reducing rate of arrests, but that the major part of this differential effect was observed during the treatment year; and that the youths in the experimental treatment condition spent significantly less time in jail for all years after baseline (Marlowe, Reid, Patterson, Weinrott, & Bank, 1989). That's the good news. The bad news was that this was the hardest group of clients we had ever treated. We used every procedure we had developed before, and made up new procedures on the spot when our strategies bogged down. The parents tended to be demoralized, and often were more delinquent than their

children. They had lost so much control of their youngsters to delinquent peers and to neglect that our therapists often had to run programs themselves with the kids until the parents could be eased into the act. Most of the kids were having significant behavioral and academic problems at school and were using drugs. At our weekly treatment supervision meetings, I spent more time acting as a cheerleader, often begging therapists to keep trying with their families, than coaching on the fine points of our treatment model. Basically, we concluded that although the treatment could work under ideal conditions and with highly skilled therapists, these cases would burn out even the best staff in an on-line community treatment agency. Of course, that is probably true with any family intervention strategy for chronic delinquents, and if one is going to do family therapy with this population, our approach is probably as good or better than other alternatives.

We concluded that there was a continuous process of deterioration in the families of conduct-disordered children. What begins as simple noncompliance in young children, even those in preschool, can progress to the parents becoming increasingly defeated, to the child developing a generalized pattern of antisocial behavior across settings, to the parents failing to supervise their children, to problems in school, association with delinquent peers, to use of drugs, and so on. Through consistent failure by the parents in trying to socialize the conduct-disordered child, they become increasingly aloof and negative in their attempts to guide, support, and set limits.

This overall assessment of the results of our work to that point led to a major change in the trajectory of our research program. First, we made a decision that we should return to the problem of working with very young

children at risk for conduct problems, with the idea that prevention would have to be more efficient than working with full-blown conduct-disordered children and their families. We decided that we needed much more information about the development of aggression during the childhood years: the development of parenting problems, particularly in the areas of discipline and monitoring; the relationship of such factors as marital and parent mental health problems, and family stress to parenting problems; and the developmental relationships of the child and family variables to subsequent problems in the school, rejection by normal peers, association with delinquents, drug use and problems with the police. Second, Patricia Chamberlain began a program of specialized foster home treatment, in which she works with chronic delinquents who have been removed from their natural parents, using carefully selected and highly trained foster parents to work with the youngsters. More about that later.

To return to our attempts to develop a model of prevention, Patterson and the other researchers at OSLC designed a longitudinal study, beginning with 200 high-risk boys in the fourth grade. The logic behind this starting point was that other longitudinal researchers such as Robins (1966) and Farrington (1983) found that stable careers of antisocial behavior began at about age 10 years. We felt that this was a good place to begin to watch the development and crystallization (SP) of conduct disorders. Recent research is showing that antisocial behavior in boys begins to stabilize as early as the first or second grade; Bev Fagot at our center is now analyzing longitudinal data begining with toddlers--but that's a different story.

At any rate, we decided that we needed to collect a wide range of data each year on Patterson's sample, including multiple modes of measurement using different agents for each construct, with data collected across home and school settings. Based on our earlier clinical work and on the research of others, we decided first to build a strong and generalizeable measure of antisocial child behavior; behavioral measures of irritable and ineffective parental discipline and coercive child behavior in the home; and a measure of poor parental monitoring. A meta analysis of longitudinal studies of aggression and delinquency conducted by Loeber & Dishion (1983), indicated that our clinical hunch that discipline and monitoring were very important in this developmental process was probably correct. They found that those two parenting variable accounted for more variance in predictions of later delinquency than any other set of variables (including such predictors as early aggressive behavior by the child, criminality of the parents, and social and economic disadvantage). Our first goal was to show that these four constructs related to one another in the way we had hypothesized in our clinical work. That is, poor/irritable discipline and coercive child behavior in the home were correlated and interdependent, that chronic discipline failure begat poor monitoring, and that poor monitoring was heavily implicated in generalized antisocial behavior.

In order to test this model, we had to have a way of looking simultaneously at multiple relationships between several constructs, each of which was defined by multiple indicators. We were forced to learn structural equation modeling procedures (SEM). Because of its popularity, we chose LISREL. Since none of us behaviorists had genuine statistical expertise, we

recruited Lew Bank to join our group. He was a new Ph.D. who had studied such multivariate procedures at UCLA. He has spent the last five years in training us to begin to understand the arcane mysteries of SEM. One of the nice things about this approach is that one can measure latent constructs (e.g., monitoring or antisocial behavior) using multiple indicators or measures. One can use factor analytic procedures to test the extent to which each indicator loads on its construct, and does not load on other constructs in the model (i.e., discriminant-convergent validity). That is extremely important to us. We believe that any given measure is biased in its own way to some extent. The SEM approach allows one to zero in on a construct using several good but imperfect measures. The approach also forces one to be specific about the directions of the relationships among all constructs in the model, to estimate the strength of each relationship, to estimate the amount of variance accounted for in constructs of interest, and to determine the extent to which the hypothesized model fits the data. The process will not tell us about cause and effect, just directions and fits of the relationships. It is a good way to determine which experiments should be done in the future.

In Patterson's longitudinal study, we collect up to 25 hours of data each year on each boy and his family. We tried to include enough measures so that we would be able to develop necessary constructs as needed. We used a variety of home and lab observation procedures: self-report, questionnaire, and sociometric measures from parents, the child, teachers, and classmates; daily report measures from parents and child; observer and interviewer global ratings; measures of psychiatric disturbance for parent and child, measures of stress and SES; interview data from the parents on the grandparents; drug and

alcohol data on parent and child; records data, including arrests, academics and discipline contacts in school; and so on. We tried to include commonly used measures and scales when possible, but ended up creating many scales and indicators to measure our constructs.

The first basic model was tested by Patterson & Bank (1986), and is shown in Figure 1. This figure shows the constructs and their indicators. Inept Discipline is measured by home-observed rates of nattering (the rate of low-level aversive behavior of the parent) and explosive discipline (observed rates of hitting, yelling, humiliating, and threatening); observer global ratings of inept discipline, and mother self-reports of ineffectual discipline practices. Child Coercion is measured by observation data on the rate at which children initiate aversive exchanges with parents and siblings, and the average duration of coercive episodes. Inept monitoring is measured by parent reports of the hours/day that the child is not supervised, interviewer ratings of lax supervision, and from interviews with the child. Generalized Antisocial Behavior is measured by questionnaire data from the parent and teacher, daily telephone data from the child, and peer nomination data from classmates. As can be seen, the indicators load fairly well on their constructs, and the path coefficients support our general model (i.e., that poor discipline and child coercion interact and exacerbate each other, that poor discipline is heavily involved with poor monitoring, and that poor monitoring is directly involved in generalized antisocial behavior). Note also that even though most of the variance in antisocial behavior is accounted for by poor monitoring, a direct path still exists between coercive behavior observed in the home and the more generalized construct. All the paths are

significant and the model provides an acceptable fit to the data. This model accounts for 46% of the variance in monitoring and 40% of the variance in antisocial behavior (i.e., 1 minus Psi).

Insert Figure 1 about here

The clinical implication of this model might be that if we teach parents to monitor and/or discipline their children more effectively, then the development of generalized antisocial might be interrupted. We are currently conducting such a clinical experiment by intervening with one group of subjects using heavy and measured reliance on training in discipline and monitoring. A randomly selected control group is receiving a brand of systems therapy that does not target such parenting skills. Using the same assessment battery as described above, we are systematically evaluating the extent to which success in teaching the two parenting skills is related to reductions in child antisocial behavior, both across and within groups. At this point, this sequence characterizes our research strategy. We use longitudinal data to identify promising candidates for systematic intervention. Then we design a clinical experiment that both provides outcome and persistence data on the technique, and an experimental test of the model.

Another set of issues that the design of Patterson's longitudinal study allowed us to investigate was the relationship of molar factors such as poverty and social disadvantage to parenting practices and to antisocial behavior. Most of us who have worked with families of oppositional or conduct-disordered children have found that parents who are under stress tend

to be difficult to work with. Also, nearly every social, family, and individual risk factor is associated with problem child behavior. It has long been our notion that background stress does increase the risk of a child becoming antisocial, because such stress reduces the ability of the parents to monitor, set sensible limits, and discipline their children effectively.

Using the same SEM approach, Capaldi & Patterson (1989) found that the effects of socioeconomic status, income and number of family transitions (i.e., two natural parents, single mother, natural mother step-father, and so on) had dramatic effects on a construct measuring general childhood adjustment, but that those effects were almost entirely mediated by their effects on discipline and monitoring (see Figure 2). These data give cause for some optimism. It is possible that the effects of a deprived environment on children at risk for poor adjustment can be mitigated if we can teach their parents basic child managment skills.

Insert Figure 2 about here

We have become interested in testing a number of other models of the relationship of parenting practices to antisocial behavior and to failure in peer relations, school, and to later delinquency. For example, in a study using longitudinal data from the fourth, sixth, and seventh grade, Patterson, Capaldi, and Bank (in press) tested the model that early deficits in monitoring were associated with antisocial behavior and poor academic achievement at grade four; that the antisocial behavior and poor monitoring at grade four put youngsters at risk for associating with antisocial peers at the

sixth grade; and that association with such peers at sixth grade put kids at risk for delinquent behavior patterns at grade seven. The model is presented in Figure 3. As can be seen, the analysis fit the theoretical model. The only path predicted that did not quite reach statistical significance was that from monitoring at fourth grade to deviant peers at sixth grade. Although not central to the model, we tested the relationship of earlier academic failure on later association with deviant peers. It failed to reach significance in this particular model.

Insert Figure 3 about here

One aspect of this model that has led us to rethink our approach to the treatment and prevention of antisocial behavior is the link between poor parental monitoring and school failure. In our previous clinical work with older youngsters, we felt that because these kids were at serious odds with their parents, and were also deeply in trouble at school and with the peer group, the problems were too large for a parent training approach to be effective. Poor parental monitoring is strongly associated with early school problems. This suggests that we should begin our attempts to prevent antisocial behavior before and during the child's transition to elementry school. From our perspective, that means we should extend our parent training to include closer monitoring of the children's activities in the shool, to teach parents to form closer alliances with teachers to allow them to actively promote the child's adaptation in that setting, and to watch the child's peer

relationships, as well. We have just submitted a grant proposal to extend our work in this direction.

In summary, our work has changed a great deal in the last two decades. We are still studying the same old problems (in fact sometimes it seems we are going backwards--we started with preschoolers and have returned to them). We changed our methodology only when we were forced to, sometimes for apparantly trivial reasons, but most often because out data raised new questions that dictated changing methodology. Although we started, as everyone else does, with a set of pet theories and data collection strategies, we found it much more rewarding to follow our data rather than to cling to methodologies with which we felt most comfortable.

A last comment. Earlier, I said that our experience with treating teenaged delinquents led to two new directions in our research. The modeling track has been described. The other direction was mentioned only briefly: specialized foster treatment of active delinquents. Although we have tried to be flexible and to change our research path on the basis of new data and ideas, we are also quite rigid in our belief that skillful and strong parents can change the trajectory of even the most delinquent children. When we discussed our limited success in treating the families of delinquents in our center staff meetings, Patricia Chamberlain took the position that we could have readily accomplished our goals if we had stronger parents to work with. Over the last five years, she has developed a treatment program, funded through state contracts, in which she takes kids who are in, or headed for, correctional training schools. She and her staff recruit extremely strong foster parents, pay them well, and train them in our parenting methodology.

She gives them a great deal of support, including occasional respites on weekends, and monitors the youngsters closely. The state funds each case for six months. She has worked with about 100 cases over the last few years and has done one outcome study (Chamberlain, 1989). The results are quite promising, and the program costs considerably less than institutionalization. She is able to place most youngsters back in their natural homes (when they still exist) and the children do significantly better in follow-up than do control youngsters.

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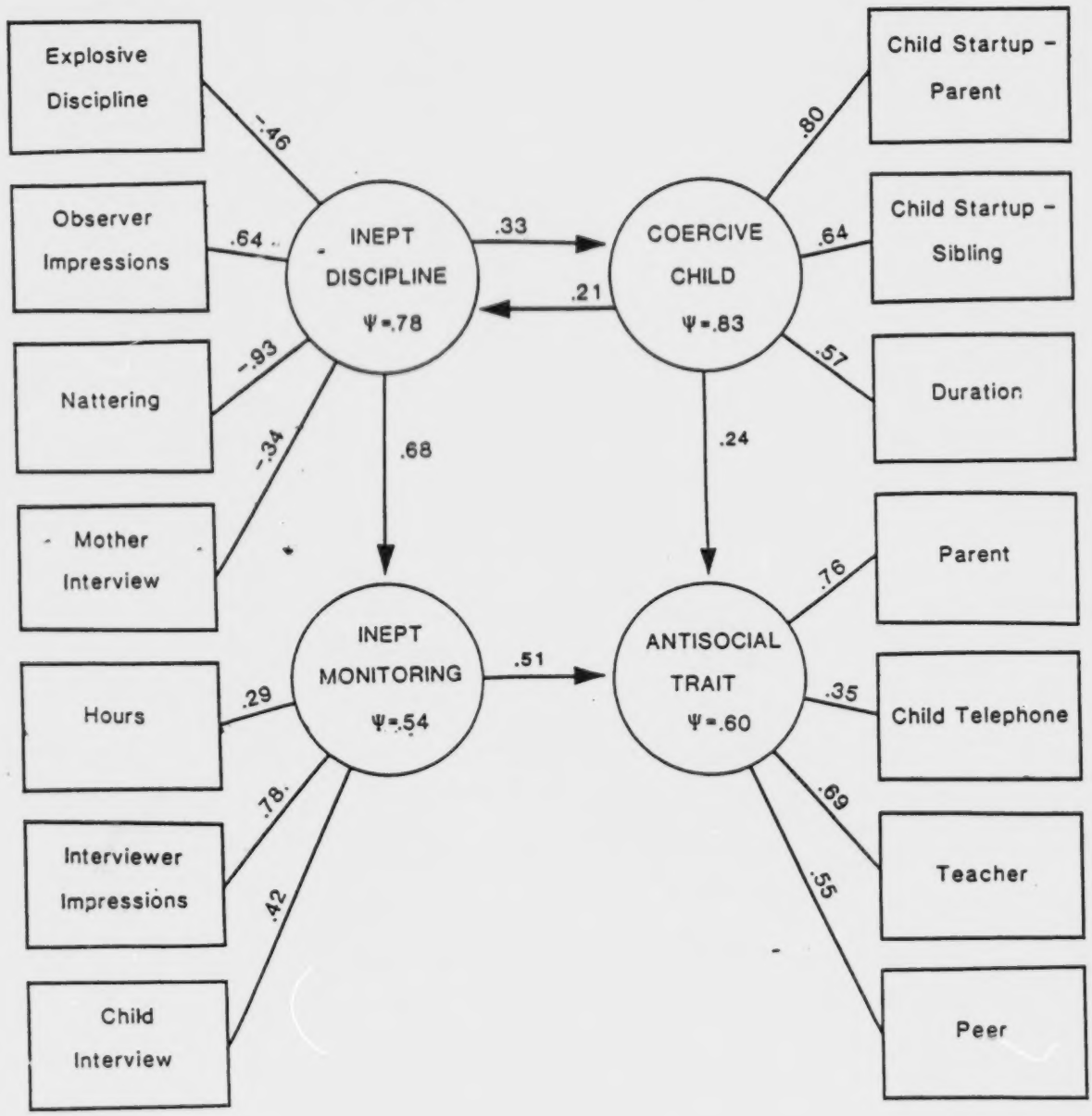
Conduct Problems

Figure 1.

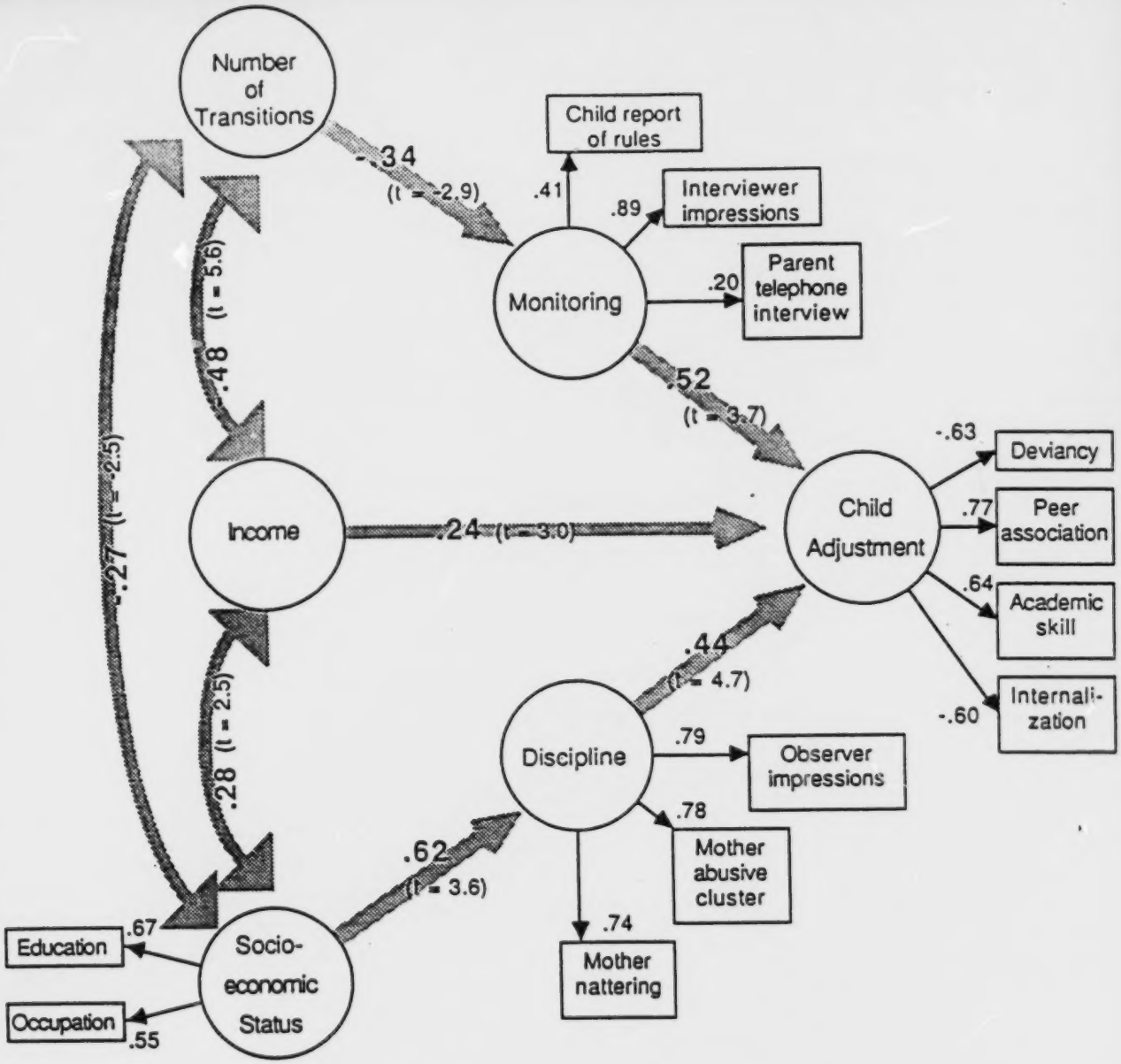
from Patterson, G. R., & Bank, L. (1986). Bootstrapping your way in the nomological thicket. Behavioral Assessment, 8, 49-73 [Figure 2].


Explosive Discipline
Observer Impressions
Nattering
Mother Interview
Hours
Interviewer Impressions
Child Interview
INEPT DISCIPLINE Ψ=.78
INEPT MONITORING Ψ=.54
COERCIVE CHILD Ψ=.83
ANTISOCIAL TRAIT Ψ=.60
Child Startup - Parent
Child Startup - Sibling
Duration
Parent
Child Telephone
Teacher
Peer
-.46
.64
-.93
-.34
.29
.78
.42
.33
.21
.68
.51
.24
.80
.64
.57
.76
.35
.69
.55

Conduct Problems

Figure 2.

Capaldi, D. M. (1988). APA poster session. Presented at the meeting of the American Psychological Association, Kansas City, KS.



R's Between Latent Constructs from Measurement Model

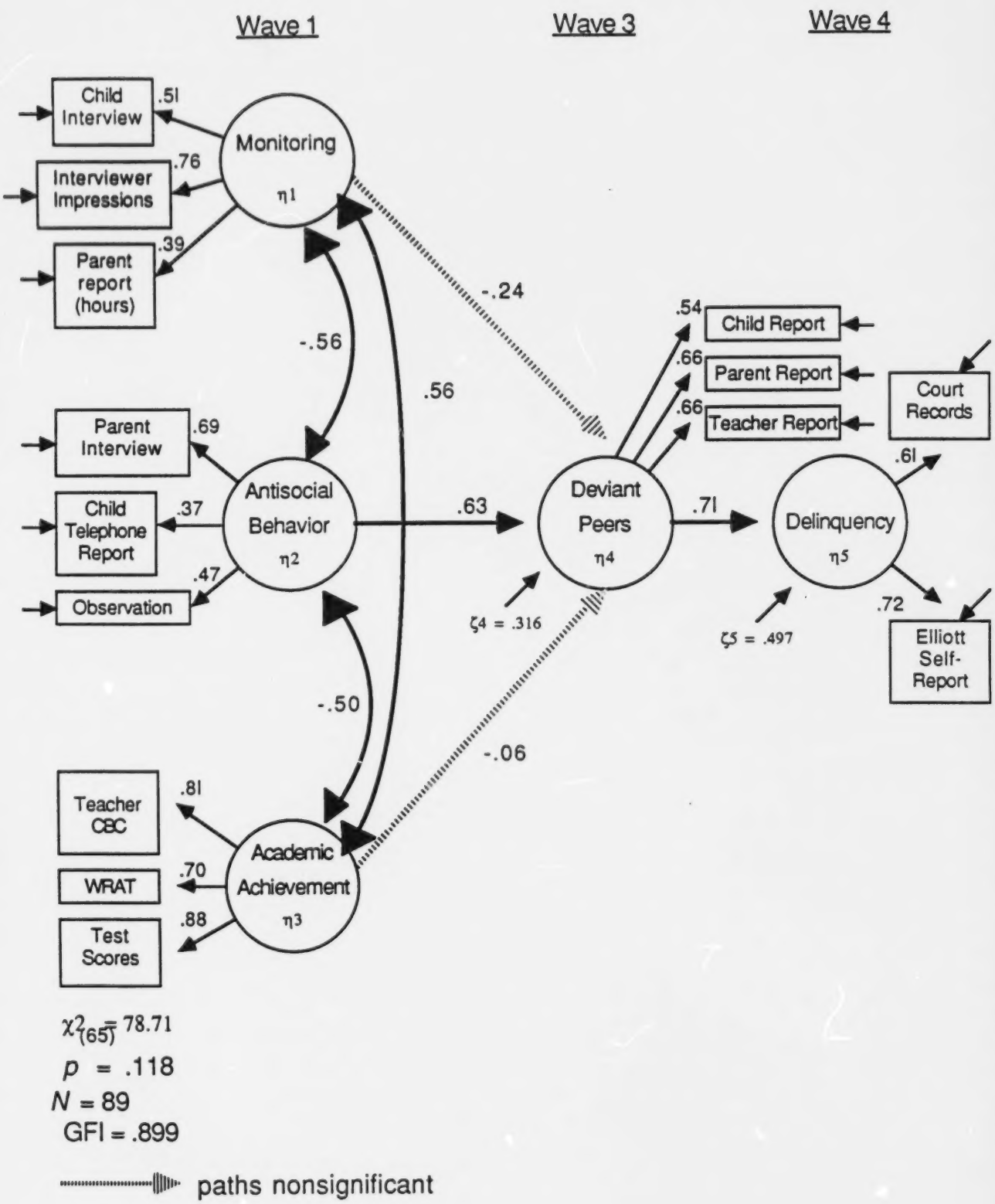
	#Trans	Income	SES	Monitoring	Discipline	Child Adj.
#Transitions	—					
Income	-.48	—				
SES	-.19	.17	—			
Monitoring	-.30	.11	.18	—		
Discipline	-.23	.28	.54	.24	—	
Child Adjustment	-.45	.41	.49	.57	.58	—

Conduct Problems

Figure 3.

Patterson, G. R., Capaldi, D. M., & Bank, L. (in press). An early starter model for predicting delinquency. In D. Pepler & K. H. Rubin (Eds.), The development and treatment of childhood aggression. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

0351C


Wave 1
Wave 3
Wave 4
Child Interview
.51
Interviewer Impressions
.76
Parent report (hours)
.39
Monitoring
η1
-.24
-.56
.56
Parent Interview
.69
Child Telephone Report
.37
Observation
.47
Antisocial Behavior
η2
.63
Deviant Peers
η4
ζ4 = .316
.54
Child Report
.66
Parent Report
.66
Teacher Report
Court Records
.71
Delinquency
η5
.61
.72
ζ5 = .497
Elliott Self-Report
-.50
-.06
Teacher CBC
.81
WRAT
.70
Test Scores
.88
Academic Achievement
η3
$\chi^2_{(65)} = 78.71$
$p = .118$
$N = 89$
GFI = .899
paths nonsignificant

UNDERSTANDING AND SELECTING DESIGNS FOR RESEARCH IN NATURALLY-OCCURRING SITUATIONS

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Practice and research in special education are changing. For example, the emphasis on placing children with disabilities in the "least restrictive environment" has led to a wide range of programs and services in many different settings. This change in practice along with other changes in special education has led to an interest in understanding what actually happens in a wide range of naturally-occurring programs and settings.

There are a wide variety of ways to study naturalistic settings. I have been asked to address how researchers in special education are to choose among alternative research designs and methodologies for studying naturalistic settings. The first step, I would argue, is to understand the goals and assumptions of the various alternatives. The second step is for researchers to become aware of their own goals and assumptions. This includes assumptions relevant to research designs, but also assumptions related to philosophical and theoretical frameworks. Having done this, special education researchers are in a better position to select an appropriate research design.

In the first part of my paper I provide a rationale for focusing on the goals and assumptions of research designs. I then explore the assumptions and goals of a range of the alternative research designs available for studying naturally-occurring situations. In the final section, I will address how to choose among the alternatives.

Before beginning the body of my talk, I'd like to mention two ways I have delimited the scope of my presentation. First, I

will focus most of my comments on research designs, although the points I am making can also be applied to research frameworks and research methods. Second, specific examples will be directed toward the study of students with "learning disabilities" (LD students). One reason for this focus is that I think it will help the coherence of the presentation to focus on one target population; the other is that the LD population is the largest special education population.

Importance of Goals and Assumptions

Shulman (1988) has pointed out that education is a field of study, "a locus containing phenomena, events, institutions, problems, persons, and processes, which themselves constitute the raw material for inquiries of many kinds" (p. 5). Consequently, educational researchers turn to disciplines and to sub-disciplinary traditions in the social sciences for philosophical and theoretical frameworks, and for research designs and methods.[1]

Because each discipline and tradition "brings with it its own set of concepts, methods, and procedures" (Shulman, 1988, p.5), educational researchers are faced with a potentially bewildering array of options at several levels. They will encounter philosophical discussions of an "alternative paradigm" (variously called qualitative, interpretivistic, or naturalistic). Researchers also will encounter discussions of alternative theoretical perspectives and frameworks, primarily from anthropology and sociology. They also will find discussions

of different research designs: case study designs, ethnographic designs, life history designs, and in-depth interview designs, to name a few. And they will find new methods of data collection (for example, participant observation, in-depth unstructured interviews) and new methods of data analysis.[2]

Shulman also made the important point that selection of research design from the wide range available should follow from the goals of the research. "We must first understand our problem, and decide what questions we are asking, then select the mode of disciplined inquiry most appropriate to those questions" (Shulman, 1988, p.15).

I would add that it is also important to take into account the assumptions that underlie the research. As postpositivist philosophers argue, all research makes assumptions, is inherently "theory-laden" (Howe & Eisenhart, 1989), and represents a particular way of looking at the world. These assumptions involve both epistemological issues (often discussed in terms of positivism and interpretivism) and theoretical issues (usually discussed in terms of the point of view of a particular discipline or tradition).

In the next section I will examine the goals and assumptions of several "generic" research designs for studying naturally-occurring situations. Then I will take one of these generic designs (single case study) and examine the goals and assumptions of some of the designs that exists within that category.

Generic Research Designs

As Shulman (1988) pointed out, research methods used in educational research have been borrowed and adapted from various social science and physical science disciplines. Researchers in these disciplines and their sub-disciplinary traditions make a variety of assumptions about what to study and how to study it. They develop and adapt research designs and methods to answer the questions they generate.

Discussions of research designs in educational research frequently ignore the assumptions that are behind the designs. Designs are presented as if they were independent of frameworks that generated them. I refer to these research designs as "generic" designs to indicate that they have been removed from the discipline or disciplinary tradition that generated them.

Within this framework there are at least three major categories of generic research designs for understanding naturally-occurring human activity and thought: designs for describing variables or examining relationships among them (descriptive, correlational and causal-comparative designs), designs for examining a complex instance or instances (case study designs), and designs for developing theory (analytic induction and Glaser and Strauss' grounded theory method).

The designs in the first two major categories may be exploratory, descriptive, or explanatory in their goals (Yin, 1989). For example, a correlation study may seek to identify possible causal factors, may seek to describe relationships among

variables, or may seek to explain patterns of behavior through relationships found. Similarly, a case study may seek to identify significant features of a setting to examine in more detail, or it may seek to describe a setting in detail, or it may seek to explain the processes it finds. The designs in the third major category are unique in their emphasis on theory-generation as their goal.

Designs for Describing Variables or Their Relationships

These designs are essentially positivistic in the assumptions they make. They assume that the phenomenon being examined can usefully be broken down and into separate, quantifiable variables that are related to one another in unidimensional ways. Moreover, they assume that the researcher knows in advance the variables that are important to examine and that the researcher knows how to measure these variables in an appropriate way. For example, a researcher interested in parents' perceptions of their children's special education classes would decide in advance what aspects of perceptions he or she thinks is important to study and would most likely develop standardized questions and a fixed range of pre-determined options for answers.[3] Researchers using these designs assume that by administering a standardized questionnaire or by carefully training observers, they can create standardized conditions and thus obtain comparable data from all individuals. They also assume that the data are quantifiable and able to be adequately captured through these techniques. In some cases,

very complex behavior or attitudes are reduced to simpler behavior or attitudes so they can be measured through standardized instruments and quantified.

These designs typically use standardized techniques of data collection and perform quantitative analyses on the data. Qualitative data can be collected (for example, videotapes or open-ended interviews) but this occurs infrequently and these data are coded and analyzed quantitatively, usually with predetermined categories.

Descriptive Designs. The goal of descriptive designs is to describe "what is." For example, teachers in a sample of schools might be given questionnaires to fill out in order to describe regular education teachers' perceptions of special education students. Another study might use checklists and time-sampling to describe the behavior of students with and without disabilities in regular education classrooms.

Correlational designs. Correlational designs (including the more complex correlational techniques such as multiple regression and path analysis) basically examine the way two or more quantifiable variables covary within a relatively large, relatively homogeneous sample. While "correlation does not imply causality" most researchers are interested in relationships among variables because they are interested in their potential causal relationships. The "process-product" studies are an example of this design. A researcher in special education might examine the relationships between specific kinds of teacher behaviors and

specific kinds of student behaviors in mainstream classrooms.

Causal-comparative designs. Like correlational designs, causal-comparative designs are a way to explain relationships among variables. These approaches aim at discovering possible causes of behavior patterns by comparing groups of subjects who have the behavior pattern with a group of subjects who do not have the behavior pattern. An example would be a study that examined the effects of resource room vs. mainstream placement by comparing the behavior of students with disabilities in the two different settings.

Designs for Understanding a Complex Instance or Instances

Yin (1989) has discussed generic case study designs, drawing from research on a variety of topics and a variety of disciplines. This section draws heavily on his work.

Case studies have the general purpose of developing a comprehensive understanding of a complex instance (United States General Accounting Office, 1987 p.9), usually with a further goal of understanding the processes occurring in the setting. Case study designs assume that it is important to study the case comprehensively, in relationship to its context and in all its complexity, rather than break up reality into isolated variables. Further, case study designs assume that multiple sources of data are important for understanding this complex reality (Yin, 1989, p.23).[4]

Case study designs can be conducted by researchers who make positivistic or interpretivistic assumptions or some combination

of the two.[5] Moreover, case studies can focus at various levels of analysis: cultural group, organization, school, classroom, program, or individual.

Yin (1989) distinguishes among case study designs on two dimensions. The first dimension is number of levels of analysis. A case study that operates at only one level of analysis is considered a holistic study; a case study that operates at multiple levels of analysis is an embedded case study. The second dimension is number of cases examined. Yin (1989) distinguishes between single case designs and multiple-case designs.

Levels of Analysis. Holistic studies, which operate at one level of analysis, are appropriate when there are no logical subunits to the case and when the relevant theory is holistic (Yin, 1989 p.49-50). An example for special education would be a researcher using organizational theory to examine the way a program is implemented at the organizational level.

Embedded case studies, which have multiple levels of analysis, are appropriate when there are logical subunits and when the theory used encompasses multiple levels of analysis (Yin, 1989). For example, a researcher with an anthropological focus might study a special education program by examining the state, district, and school contexts of the program; the implementation of the program at the classroom level; and the interpretations of the program by various subgroups within the school.

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Number of Cases. Single cases are generally selected for one of several reasons. The case might be a critical test of theory or assumptions (Yin, 1989). For example, if it is assumed that structured methods of instruction are necessary for LD students, a case study of a program that successfully uses unstructured methods of instruction could be a critical case. A single case study might involve a unique or extreme case (Yin, 1989), such as a mainstream situation that is producing exceptional results. The case might reveal new phenomena (Yin, 1989). For example, a single case study might document the implementation and effects of a new treatment mode. A case study might also provide a new look at "old" phenomenon. For example, a case study of a "typical" mainstream classroom might lead to new insights about the processes going on there.

Yin (1989) identifies two purposes for multiple-case designs. The first purpose is literal replication. For example, a researcher might study several classrooms as instances of mainstreaming. Each classroom would be a separate case study. The results across the case studies would be examined for consistent patterns similar to the way replications of experiments would be examined for consistent patterns. The second purpose of multiple-case studies is to test theory or get at cause and effect (Yin, 1989). For example, a researcher interested in the effects of different models of teacher education might identify two teachers who match on potentially relevant variables except their method of training. The

researcher might then conduct a case study of each teacher and compare the results to get at the effects of the two methods of teacher education.

Designs for Developing Theory from Complex Instances

The interest in developing rather than testing theory comes from interpretivistic assumptions. Analytic induction and the grounded theory approach (Glaser, 1978; Glaser and Strauss, 1967; Strauss, 1987) are two designs aimed at developing theory.[6] As Glaser and Strauss state concerning grounded theory, the goal is "not to provide a perfect description of an area, but to develop a theory that accounts for much of the relevant behavior" (1967, p.30).

Because the grounded theory approach is of particular interest in education today I will explore it briefly. Data collection and analysis proceed simultaneously with the goal of developing more and more abstract analytic levels as the analysis proceeds. Sampling is driven by the need to gather information needed to develop and expand the developing theory. As one develops more abstract theoretical work, one would seek to maximize diversity among the groups sampled. Thus, to expand the theory being developed a researcher would sample groups other than those sampled at the beginning.

Variations in Case Study Designs

Yin has performed an important service by identifying the "generic" case study designs discussed above. However, by abstracting common features across specific case study designs,

his analysis masks important variations in design and underlying assumptions associated with case studies as developed and implemented within specific disciplines and traditions. In particular, his analysis obscures the variability within case study designs in terms of the philosophical and theoretical assumptions that helped generate the designs.

To illustrate the variability that exists across case study designs I will examine several case study designs (specimen record design, ethnographic field study design, ethnographic interview design, and microethnographic design) which have been developed within various social science traditions. For each I briefly describe the research design along with its assumptions, goals, and disciplinary roots. The following discussions are presented as illustrations, not as a complete inventory of existing options.[7]

Specimen Record Design

The specimen record is a research design developed and used by ecological psychologists who are interested in the relationships between human behavior and its environment. The goal of this design is to describe an individual's perceived environment and goal-directed behaviors. To compile a specimen record, nonparticipant observers write a narrative description over a substantial period of time of the behavior of the person being studied and those aspects of the observable situation that are relevant to the child's goal-directed behavior (Schoggen, 1978, p.43). The observer makes "low level inferences" about the

child's goals, purposes and feelings, much the way persons engaging in ordinary social discourse would do. This "stream of behavior" is then divided into segments based on the target person's goal-directed actions. Coders draw upon their ordinary knowledge and perceptions to infer the goals that the actors intend to achieve, marking off sections of narrative descriptions into segments that lead toward specific goals (Wright, 1967, pp.25-27). These segments are then coded and analyzed quantitatively.

Using this design a researcher might compile a specimen record of an LD child's activities throughout a day, both in and out of school, to examine how those two environments differ for the child. Or a researcher might compare the environments of children who are categorized LD to the environments of comparable children not labeled, with the goal of understanding how the environments of the two groups contrast.[8]

Ethnographic Field Study Design

Ethnographic field study designs were developed by anthropologists and sociologists. For our purposes here I will discuss these designs from an anthropological point of view. Anthropologists use culture as their primary framework for examining the behavior and meanings of participants. Their goal is to describe and explain the cultural behavior and beliefs of groups of people, along with the larger context of the setting examined.

Research design in ethnographic field studies is seen as

emergent, with data collection and data analysis co-occurring and informing one another. Researchers usually start with a broad focus, seeking to identify what is important to understand in the setting and its context. Over time the focus narrows.[9]

Researchers using an ethnographic field study design usually begin with a broad theoretical framework that guides their data collection and analysis. However, this framework does not constrain either their final focus or their interpretation since they are trying to understand the culture of the participants and what is actually happening.

One feature of ethnographic field study designs is that researchers typically collect much of their data through "fieldwork" which usually involves participant observation and informal interviews. The researchers are not limited to these methods of data collection and usually collect a wide range of data relevant to their setting. Participant observation data and informal interviews are generally analyzed qualitatively with an emphasis on elucidating the complex relationships that exist. However, it is not unusual to include quantitative data in these case studies. But the anthropologist would usually have made an effort to make sure that the categories used to collect and analyze the data were culturally meaningful.

An anthropologically-oriented field study researcher might examine a group of LD students inside and outside the classroom with a goal of developing an describing and understanding their lives. Through participant observation, informal interviewing

and other methods, the researcher would study not only the LD students themselves but also the various persons who interact with and influence the LD students. The goal would be to examine the culture(s) of the two settings and examine how those cultural assumptions and values influence the behavior of the LD students.

Ethnographic Interview Design

This research design was developed by cognitive anthropologists who define culture in purely mentalistic terms, i.e, they are interested in studying how cultural groups organize their cultural knowledge, primarily as it is expressed through their language.

This design is similar to the field study designs in that data collection and data analysis interact together. For example, information received in one interview is used to help formulate questions for the next interview. Data are initially collected through very broad, open-ended interviews; later data may involve more focused questions. Data analysis is usually qualitative, although quantitative analysis is not precluded. In the design presented by Spradley (1979) researchers would analyze interviews to identify domains of knowledge, determine how terms in each domain are organized, study the attributes of terms in each domain, and discover relationships among the domains identified.

A researcher in special education might use this design to examine how special education teachers conceptualizations of LD students are organized. What categories of LD students do

special education teachers identify? What attributes do they associate with each category? How do their conceptualizations of different kinds of students relate to one another?

Microethnographic Design

This research design was developed from work in anthropology, sociology, and linguistics. These microethnographers, or ethnographers of communication, study culturally-patterned verbal and non-verbal communication. They are interested in specifying the patterns and processes of face-face-interaction and in understanding how these "micro" processes are related to larger "macro" issues of culture and social organization (Erickson & Mohatt, 1982, pp.137-138).

The microethnographic design typically begins with a period of broad focused observation, much like what holistic ethnographers do. However, the goal is not description of the complexity of a culture or even a part of it. The goal in this first phase is to identify significant situations of face-to-face interaction for more intensive study. Researchers then gather focused data in these selected situations, usually recording relatively long, uninterrupted segments on audiotaped or videotaped data to capture natural face-to-face interaction and its context. Researchers index the data for major social occasions, select segments for detailed analysis, repeatedly view the segments to develop and refine analytic categories, and then code the data. Analysis of patterns may be either qualitative or quantitative or both.

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Mehan and his colleagues (Mehan, Hertweck, & Meihls, 1986) used this approach to examine the processes by which some students get referred as possible LD students by their regular education teachers. They conclude that "the teacher's decision to refer students is only partially grounded in the students' behavior" (p.86). The teacher's decision is also grounded in the categories the teacher brings to the interaction. Moreover, "what teachers bring to the interaction with students seems to mediate what students do with the teacher in classroom interaction" (p.87).

In a related study, Rueda and Mehan (1986) examined several microethnographic case histories of students with learning disabilities. They found situational variability in the LD students' success with tasks, especially those involving reading. They conclude that "this situational variability in performance seems to arise because students with learning disabilities are working on two tasks at once: managing their identities and managing an intellectual task. They employ strategies directed at avoiding the task presented to them and managing the situation so as to appear competent" (p.158).[10]

Adapting Tradition-Based Case Study Designs

Each case study design discussed above can be abstracted from its original theoretical framework in order to answer questions generated from sources, i.e., be treated as a generic design. For example, a special education researcher who does not have an anthropological perspective could adapt the

ethnographic field study design while using another theoretical perspective to study an exemplary mainstreaming situation.[11] Or a researcher could adapt the microethnographic design to examine cognitive processes (rather than cultural processes) that occur in particular kinds of programming.

However, I would offer two cautions. First, educational researchers who use a case study design without the general theoretical framework associated with its development need another framework to guide their work. This is true even of case study designs that are based on interpretivistic assumptions. As Whyte (1984) stated:

> It is impossible to do research without theory because, at the outset of any project, theory indicates what phenomena are important to study...[T]o plan a project [a researcher needs] orienting theory--orienting in the sense that it indicates what phenomena deserve particular attention and what other phenomena can be disregarded or be accorded less attention (p.275).

In matching their theoretical framework and questions with an appropriate research design, researchers should examine them for consistent assumptions.

Second, it is important to distinguish between using a research design with its original theoretical framework and adapting it to answer questions from other sources. For example, Wolcott (1980) has argued that only studies involving sociocultural theory should be called "ethnographies."

Summary and Discussion

Informed choices among research designs for understanding naturally-occurring human activities and thought can best be made when educational researchers understand the options available. In this paper I presented a framework for developing this understanding and demonstrated its application.

Education is a "field of study" and, therefore, educational researchers draw on a variety of disciplines for research designs and methods as well as for theoretical frameworks to guide their research. The research designs and methods they employ usually have been developed by researchers in disciplines to answer questions generated by the assumptions and theoretical perspectives of their discipline or sub-disciplinary tradition.

All research designs are based on assumptions. Because of this each design offers a particular avenue into naturally-occurring human life; no one design offers "Truth." Consequently, it becomes important to understand the assumptions and goals of the varying methods in order to be able to select appropriately.

Using this perspective I examined several designs for studying naturally-occurring education. This analysis indicated that there are a number of alternatives to the traditional descriptive, correlational and causal-comparative designs. I made a distinction between case study designs (which might have exploratory, descriptive or explanatory goals) and designs that seek to generate theory. I explored some of the variety of

designs for case study research and the disciplines and traditions that generated the designs. In doing this I made a distinction between using a design in conjunction with a theoretical framework associated with the discipline that developed the design and using a design without such a framework.

There are a several points I want to make from this analysis. First, researchers can study naturally-occurring situations without sharing any interpretivistic assumptions except that it is important to conduct research in natural settings. Second, the "alternative" designs examined share interpretivistic assumptions to varying degrees. Third, this analysis indicates that besides a range of alternative research designs (and methods) there are alternative theoretical frameworks. Fourth, educational researchers can abstract and use designs without the theoretical frameworks used to develop them but they should then have an alternative orienting theory to guide their work.

Choosing Among Alternatives

As the practice of special education has been moving to a variety of educational programs in a variety of settings, it is appropriate for research in special education to be examining and using research designs and frameworks that help them better understand the complex situations they are encountering. But how are researchers to choose among the alternatives that exist?

My experience from talking with educational colleagues and students interested in "qualitative" research is that they come

to this interest with a wide range of assumptions. Some only share interpretivism's interest in studying naturally occurring behavior. Some like the open-ended aspect; they don't want to decide a priori what is important to look at. Some want to understand what educational programs mean to the participants. A few are interested in an anthropological view of the world. Some may want to generate theory. My discussion today suggests that there are research designs (and theoretical frameworks) that fit with these various assumptions. The problem is linking up the researchers and the appropriate designs and frameworks.

I think special education researchers, and educational researchers in general, need to identify their basic assumptions and goals. When almost everyone shared the same positivistic assumptions it was easy to select a design or framework without thinking too much about one's assumptions. I think things are not that easy now. Researchers need to be aware of their assumptions in selecting a research design and in selecting a theoretical framework.

If a researcher assumes that he or she knows the important variables to study and how to define them and if he or she wants to gather data over a large sample, traditional methods of descriptive or correlational research may be appropriate.[12] A big advantage of these designs is the ability to collect comparable data over a large group. One disadvantage of this approach is that the researcher may be totally off base in his or her assumptions about what is significant or about how it should

be measured. Another disadvantage is that these designs focus on a limited number of isolated variables and therefore would not be helpful for understanding a complex and highly interdependent situation.

If a researcher has the goal of developing theory, he or she would find the grounded theory approach helpful.

If a researcher has descriptive or explanatory goals and assumes that it is important to approach the topic in a more holistic way with a focus on the complexity of relationships and meaning of behavior and events to participants, then a case study would be appropriate. Case study designs in general offer ways of describing and analyzing the variety of complex situations that exist today. Case study designs offer some important benefits. By not artificially or prematurely examining isolated variables case study designs help us understand the complex reality that life is. They provide a means for studying processes that occur, in contrast to other designs that focus solely on inputs and outcomes. By including a study of context, case study designs can help up begin to build generalizations from detailed descriptions of specific instances (Cronbach, 1975; Erickson, 1986).

If a researcher further assumed that much of the participants' meanings were tacit or difficult to articulate, he or she would find a field study design that used participant observation to be helpful.

If a researcher found that the psychological frameworks that

they had been using in education did not adequately account for the behavior and meanings they were examining in natural setting, there are alternative frameworks in the social sciences, in particular those that have developed the designs discussed above.

For example, ecological psychology offers a way of looking at the relationships between individuals and their environment. The various traditions of anthropology offer frameworks for examining the contexts of educational programs, institutional pressures, the role of culture in education, learned beliefs and behavior, social interaction, and peer processes.

In sum, these "alternative" research designs and frameworks offer tremendous resources for researchers in special education. To unlock these riches, special education researcher need only to understand the assumptions and goals of the "alternative" designs and frameworks, identify their own assumptions and goals, and find appropriate matches.

Notes

1.Note that I am talking about educational researchers here. The point has been made that educational practitioners share pedagogical knowledge. Whether this knowledge is the equivalent of disciplinary knowledge is not clear.

One implication of viewing education as a field of study is that educational researchers should "not limit their education to methodology alone, for only in combining substantive knowledge and methodological competence will you become a well-rounded, effective educational researcher" (Shulman 1988, p. 16).

2.Existing general educational research methods texts do not help the situation. Texts still are dominated both in terms of point of view and in terms of number of pages by positivistic approaches. Moreover, discussions of alternatives to positivistic approaches are limited in scope and not comparable across texts. For example, one text (Gay, 1987) discusses naturalistic research as a type of observational research. It contrasts nonparticipant observation, participant observation, and ethnography. Case study research is treated as a subheading of nonparticipant observation. The new edition of the text by Borg and Gall (1989) explicitly discusses the assumptions underlying "qualitative" research but devotes less than 30 pages to how to conduct it, in a book over 900 pages long.

3.A pretest usually is done using a first draft of the standardized instrument. However, this draft instrument already has many assumptions embodied within it.

4.This discussion distinguishes between case study designs as defined above on the one hand, and single group experimental designs and single-subject designs on the other. These experimental designs differ from the case study designs discussed here in that they involve experimental manipulation by the researcher and they study isolated variables rather than the complex situation and its context.

5.It is beyond the scope of this paper to discuss positivistic and interpretivistic assumptions in any detail. Research and practice in special education has been heavily influenced by positivistic assumptions (Heshusius, 1982; Stainback and Stainback, 1984). Interpretivistic assumptions include the following: human reality is heavily influenced by the meanings people assign to behavior and events, human reality is complex with mutually interacting causes and effects, it is important to describe what happens in natural settings and to understand the

role of context, it is important for researchers' to subjectively experience the life of those they are studying, and theory development should follow from and build on careful descriptions of human behavior and thought in natural settings (see Erickson, 1986; Lincoln & Guba, 1985). Disciplines and their traditions draw on positivistic and interpretivistic assumptions to varying degrees (see Jacob, 1988).

6.Glaser and Strauss (1967) claim that the grounded theory approach has broad application and can be used with either qualitative or quantitative data. On the basis of this claim I have treated it as a "generic" design. However, the design and method developed from the particular tradition of Chicago sociology (Charmaz, 1983).

7.See Jacob (1987, 1988) for fuller discussions of these traditions; see Atkinson, Delamont and Hammersley (1989) for an introduction to some British traditions.

8.See Schoggen (1975) for such a study of children with and without physical disabilities.

9.An image I find helpful is that of a wide mouth funnel, with one side being data collection and the other data analysis. Over the period in the field, the researcher travels in a spiral down the funnel moving between data collection and data analysis, gradually focusing in more narrowly.

10.Edgerton's work (Edgerton, 1963, 1967; Edgerton & Langness, 1978; MacAndrew and Edgerton, 1964) with mentally retarded adults in community and institutional settings provides examples of this kind of study. This work is particularly unique in its emphasis on trying to understand how the mentally retarded feel about themselves and their lives.

11. The publication by the United States Government Accounting Office (1987) on "case study evaluation" presents a methodological discussion of ethnographic field study designs without reference to anthropological theory and applied to evaluation concerns.

12.Note that this could be a positivistic researcher deciding a priori that they know the variables or an interpretivistic researcher who has identified and defined the variables after a period of inductive research.

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PANEL DISCUSSION

Moderator: Lynn Fuchs

Introduction to Panel Discussion:
The Importance of Individual Differences
to Special Education Effectiveness

One regular feature of the annual Project Directors' Meeting is a panel discussion, where the focus is one substantive question, of critical importance to the field of special education, along with its key research methodological issues and problems. The planning committee of the 1989 Project Directors' Meeting decided that the panel discussion at the 1989 meeting would address the issue of individual differences and their importance to special education effectiveness. The planning committee invited Debra Speece, Alan Hofmeister, and Stanley Deno to make presentations representing different perspectives on this issue.

Rationale for Importance

The broad questions addressed by the 1989 Project Directors' Meeting panel discussion were: (a) How important are individual differences in the design of effective special education programs? and (b) What are the critical methodological and conceptual considerations when attempting to shed new light on the old issue of the importance of individual differences?

The notion that students should be taught by an instructional method ideally suited to their interests and abilities is not new. In 1911 Thorndike strongly endorsed individualization of instruction. He wrote: "Since human nature does not fall into sharply defined groups, we can literally never be sure of having a dozen pupils who need to be treated exactly alike" (Thorndike, 1911, p. 51).

In the years since, there have been numerous calls for the individualization of instruction (e.g., Berliner & Cahen, 1973; Corno & Snow, 1986; Cronbach, 1967; Snow, 1986). The basic premise is that individual performance in education will be a product of whatever mixture of predispositions the individual brings to that performance in interaction with the demands of the educational tasks and the instructional structure superimposed on those tasks (Corno & Snow, 1986).

Within special education, a fundamental belief in the importance of individual differences is reflected in our research questions, our teacher preparation standards (e.g., Council for Exceptional Children Delegate Assembly, 1983), our instructional materials and curricula (e.g., Mastropieri & Scruggs, 1987; Sulzer-Azaroff & Mayer, 1986; Wolery, Bailey, & Sugai, 1988), and perhaps most clearly in our federal law (PL 94-142), which mandates an individualized education program for every student served by special education.

Despite the pervasiveness of this assumption within special education, as well as in educational psychology (see, for example, Corno & Snow, 1986; Snow, 1986; Tobias, 1976), the value or importance of individual differences has been questioned in recent years (e.g., Lloyd, 1984; Goodlad, 1983). The cause for concern stems from the state of research and practice. Theories of individual differences have been vague (Reynolds, 1988; Snow, 1986). Taxonomies of individual differences and instruction are limited (Corno & Snow, 1986; Tobias, 1981). Moreover, systematic procedures for researching and accomplishing instructional adaptations never have been clearly established or validated (Arter & Jenkins, 1979; Phillips, 1986;

Reynolds, 1988; Tobias, 1981), including important problems with data-analytic strategies (e.g., Levin & Peterson, 1984; Reynolds & Wilson, 1986).

Organizing Framework

The set of papers to follow addresses these issues from three perspectives. First, Debra Speece, in "Aptitude-Treatment Interactions: Bad Rap or Bad Idea?," examines the role of individual differences in special education research and practice through analysis of Aptitude-Treatment Interaction (ATI) methodology. ATI has been the major methodological approach for studying individual differences and relating those individual differences to interventions. She examines each component of the ATI premise in terms of problems with current conceptualizations and potential ways of solving those problems. She concludes that with updated methodological approaches, the potential may still exist for ATI to contribute critical information for special education practice.

Next, in "Individual Differences and the Form and Function of Instruction," Alan Hofmeister discusses the pragmatics of implementing special education treatments tailored to individual differences, and questions the extent to which individualization is critical for special education effectiveness. He reviews and compares selected, currently available methods for operationalizing individualization, in light of the effective teaching literature. He focuses discussion on problems associated with focusing on the instructional setting as a salient variable in adapting instruction to individual differences, and reviews the research literature commenting on the potential of technology for delivering individualization. Dr. Hofmeister concludes by recommending

the effective teaching literature as a source of practical information for addressing individual differences in cost-effective ways.

Then, in "Individual Differences and Individual Difference: The Essential Difference of Special Education," Stanley Deno explores the predominant method of conceptualizing individual differences in psychology -- the ATI approach that attempts to dimensionalize individual differences. He explores reasons for the failure of that method to produce successful outcomes for individuals. In light of the historical failure of ATI, however, he suggests that we ought not reject the importance of individual differences within special education. Rather, he proposes that formative evaluation, which focuses on evaluating the effects of treatments at the individual level and revising treatments in response to individual evaluation, represents an alternative, potentially more effective method for addressing individual uniqueness in education programs.

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Individual Differences and the Form and Function of Instruction

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Running head: INDIVIDUALIZED DIFFERENCES AND THE FORM AND FUNCTION OF INSTRUCTION

Abstract

Selected approaches to the individualization of instruction are reviewed and compared to the findings of the effective teaching literature. The instructional setting, as a salient variable in instructional adaptions for individual differences, is questioned. Special educators should focus on the needed, validated, student learning experiences. To accomplish this, the special educator should emphasize the function, not the form of instructional treatments. It is recommended that the effective teaching literature be viewed as a source of practical information on cost-effective approaches that address instructionally relevant individual differences.

Individual Differences and the Form and Function of Instruction

In individualized instruction, individual student needs drive the selection and modification of instructional experiences. We create a major problem if we use the term individualized instruction as an antonym for group teaching. Such an interpretation implies that individual needs cannot be met by group teaching. The mastery of certain social skills, or the preparation of a student for declassification as a special education student may demand group teaching as the only vehicle for meeting important individual needs.

Instead of asking, "What learning experiences are needed to generate the required individual student outcomes?" and then structuring the most cost-effective environment, or combination of environments to deliver the needed learning experiences, we sometimes reverse the process, select the setting first, and then try to create the needed range of learning experiences within the selected setting. An even more undesirable possibility would be the selection or rejection of a setting on the assumption that what occurred in that setting would be consistently effective or ineffective.

In the following discussion, two approaches to meeting the individual needs of students with mild handicaps will be discussed in relation to the research literature on effective teaching practices. One approach is the "typical" individual programming found in many resource rooms, and the other approach addresses "individualization" through the use of technology.

Priorities for Understanding Instructional Environments

Leinhardt (1977), in discussing approaches to research and evaluation on the effects of instructional programs, warned of the lack of value associated

with "black box contrasts," because they serve to disguise more important variables. Many of the comparisons of group and individual instructional settings are confounded by such powerful variables as mastery learning (Kulik & Kulik, 1987). Given that mastery learning can be implemented in a range of group and individual settings (Kulik & Kulik, 1987), it makes little sense to claim an advantage for a setting when mastery learning is present in that setting and not in the comparison setting. It would be far more helpful to claim an advantage for the specific instructional practices responsible for the difference in impact between the settings being compared.

Epps and Tindal (1987) made the following observation on the issue of relevant variables and instructional settings.

> Furthermore, education setting, as a global unit is not the salient variable that determines the success of instruction. Rather, certain features of educational interventions systematically affect outcomes, but are not unique to one setting in particular. (p. 227)

What are Salient Variables?

While special education was occupied with research on the efficacy of different treatment settings (Carlberg & Kavale, 1980), regular education was conducting an intensive programmatic line of research searching for those instructional practices that served to discriminate between effective and less effective teaching. This "effective teaching" literature documented relationships among teacher performance, student learning experiences, and pupil outcomes (Capie & Tobin, 1981; Medley, Soar, & Soar, 1975).

Some of the elements consistently associated with effective instruction in regular education included: (1) a concern for the use of teacher and student time; (2) an emphasis on the curriculum; (3) the planned introduction

of new material in small steps, integrated with guided practice, and followed by carefully managed independent practice; (4) the careful monitoring of individual student progress with coordinated reteaching based on student performance; (5) attention to the mastery of prerequisite skills and frequent reviewing to ensure that new content was successfully introduced and consolidated, and (6) a set of classroom management skills that depended on a strong instructional program and active, positive, teacher involvement with all students in all phases of the instructional process (Brophy & Good, 1986; Hofmeister & Lubke, 1990; Rosenshine & Stevens, 1986). These characteristics of effective instruction also apply to the instruction of students with mild handicaps (Bickel & Bickel, 1986; Christenson, Ysseldyke, & Thurlow, 1989; Larrivee, 1985).

While these effective teaching characteristics appear to be common denominators in a wide range of instructional settings, one should not assume that such characteristics make up the total act of teaching. As researchers continue to accumulate knowledge on effective teaching procedures, the teacher's approach to specific curriculum content is receiving more attention (Kelly, Gersten, & Carnine, in press; Moore & Carnine, 1989). Porter and Brophy (1988) noted that there is a growing interest in instructional skills related to the organization, sequencing and presentation of content to ensure "meaningful understanding." They noted, for example, that "Effective teachers not only know the subject matter they intend their students to learn, but also know the misconceptions their students bring to the classroom that will interfere with their learning of that subject matter" (pp. 79-80). The effective teaching research is still evolving and continues to consolidate the more general principles, while producing complementary findings related to the

structure and presentation of specific curriculum content.

In the process of generating the effective teaching literature, researchers progressed through years of correlational research to identify promising variables which then had to be validated by experimental research. In the process of trying to identify effective practices, researchers also made observations about some of the less productive practices. In an observation that questions some prevalent practices in programs for mildly handicapped students, Brophy (1986) observed, "Research has turned up very little evidence suggesting the need for qualitatively different forms of instruction for students who differ in aptitude, achievement level, sociometric status, ethnicity, or learning style" (p. VI-122).

In special education, a professional concern for individual differences often generates a less professional reaction in which students are subjected to a host of unvalidated treatments designed to accommodate a wide range of static individual differences in personality and learning style. In many cases, neither the assessment procedures to prescribe the individual interventions nor the associated treatments have been validated (Fuchs & Fuchs, 1986; Gallery & Hofmeister, 1978). A related problem appears to be the lack of appreciation for the complexity and costs involved in implementing even a few accommodations for proven instructionally relevant individual differences. It is probable that a poorly planned accommodation to meet an additional individual difference of questionable relevance may defeat an existing accommodation for a more salient variable.

Accommodating Differences in Content Mastery and Needed Learning Experiences

In synthesizing some of the effective teaching research literature, Hofmeister and Lubke (1990) noted that the more effective teachers provided the sequence of student learning experiences listed in Table 1. They also noted that all teachers at some time provided these experiences; however, the effective teachers provided the appropriate experiences in the correct amount at the right time in response to student needs. One example of differences between effective and less effective teachers relates to the relative emphasis placed on guided and independent practice. The typical less effective teacher placed an overemphasis on independent practice at the expense of guided practice, while the more effective teacher preceded independent practice with extensive guided practice. This effective teacher also monitored student performance to ensure that students were not placed in independent practice prematurely (Anderson, Evertson & Brophy, 1979, Good & Grouws, 1979; Rosenshine & Stevens, 1986).

Insert Table 1 about here

Haynes and Jenkins (1989), in a comparison of regular classroom and resource room practices, noted that the students were on-task more in the regular classroom than in the resource room. More importantly, they noted that the "individualized" teaching in the majority of resource rooms resulted in more than half of the instructional time being spent in independent practice. In their efforts to individualize on the basis of curriculum content, the resource room teachers were not able to supply the needed guided

practice. Individual needs for large amounts of guided practice could not be met because the teacher could not supply such experiences on a one-to-one basis, even with a seven-to-one pupil-teacher ratio.

The large investment in individual programming and advantageous pupil-teacher ratios resulted in a profile of guided and independent practice distribution typical of an ineffective regular classroom. Haynes and Jenkins (1989) were able to identify a subset of resource rooms in which the profile of effective teaching characteristics was much more consistent with effective regular classrooms. This subset used teaching methods emphasizing highly targeted direct instruction delivered to small groups. The researchers concluded that the extreme variations in instructional practices present in the resource rooms prevented the resource room setting from being considered a standardized intervention.

Technology and Individual Differences

Interactive video. In many educational applications of technology, there is a strong tendency to place form before function. In many school districts, computer hardware is purchased with little planning regarding the function of the hardware (Hofmeister, 1984). One of the most highly regarded technology-based delivery systems is the interactive videodisc learning station. In these individual learning stations a computer and a videodisc player combine to present still or motion audio and visual stimuli. The student responds via keyboard or touch screen, and the system adjusts the instruction based on individual student responses.

As researchers worked on the development and validation of a range of interactive videodisc programs in math, language arts, and social skills for

different special education populations, a clear trend emerged (Hofmeister, 1989; Thorkildsen, 1986). While these programs often achieved the instructional objectives set for the programs, the comparative advantages over other forms of instruction in public schools disappeared when the student gains were weighed against the costs of implementation and the lack of flexibility associated with the delivery system.

In an effort to identify more cost effective delivery systems, the researchers decided to focus on the needed instructional functions first and then design a delivery system to support the functions. In this redesigned delivery system a teacher controlled a videodisc player through a remote control, and most of the instruction was provided in group settings, although the program was validated for use in both group and individual settings. The instructional methodology was based on the findings of the effective teaching and direct instruction literature (Engelmann & Carnine, 1982), and programs were successively refined based on a series of field tests and consultant reviews. These math and science programs, directed at Grades 5 - 8, consistently achieved their objectives with special education and regular education populations, and were delivered at one-tenth of the cost of the interactive video, individual, learning station (Hasselbring, Sherwood, Bransford, Fleenor, Griffith, & Goin, 1987; Hofmeister, Engelmann & Carnine, 1985; Hofmeister, Engelmann & Carnine, 1989; Miller & Cooke, 1989). In a series of studies comparing the same videodisc content used in group and individual learning station settings, no achievement or cost advantage was found for the individual learning station setting (Thorkildsen, 1986).

Some of the highly touted attributes of interactive videodisc learning stations, such as self-pacing and rapid, frequent, branching, turned out to be

more of a problem than an advantage. The self-pacing of many special education students is often an attribute to modify rather than an attribute to be accepted and accommodated. Our observations, as well as those of others (Havita, 1988), suggested that the individual learning station may accentuate differences rather than facilitate inclusion in the mainstream. The facility for extensive, rapid branching, present in the interactive, computer-based, learning station, may be overkill. Extensive branching is usually associated with a high error rate. It appeared to be far better to prevent errors by providing the necessary emphasis on prerequisite skills, systematic review, and guided practice in small steps.

Computer-assisted instruction. In a discussion of the comparative value of computer-assisted instruction (CAI), Walberg and Wang (1987) questioned the value of present forms of computer-assisted instruction as a comprehensive form of instructional delivery. The research on the cost effectiveness of this form of individualized instruction has generated an inconsistent set of findings that have disappointed those advocating this delivery system on the basis of setting characteristics (Bracey, 1988; Knoppel & Edelson, 1989).

The contradictory nature of the research on CAI is typical of most of the research comparing mediated instructional settings against other mediated and non-mediated settings. Clark (1983) conducted a review of the research literature concerned with the comparative value of different media-based delivery systems, including CAI. He concluded his review as follows:

> The point is made, therefore, that all current reviews of media comparison studies suggest that we will not find learning differences that can be unambiguously attributed to any medium of instruction. . . Future research should therefore focus on necessary characteristics of

> instructional methods and other variables (task, learner aptitude, and attributions), which are more fruitful sources for understanding achievement increases (p. 457).

Clark's conclusions were exemplified by the findings of Ragosta (1983), when she provided an explanation for one of the most comprehensive and successful of the CAI studies. In her conclusions she gave no credit to unique characteristics of the CAI medium and stated:

> The success of CAI in this study may be related to the successful practices identified in other effectiveness studies: Mastery learning, high academic learning time, direct instruction, adaptability and consistency of instruction, an orderly atmosphere with expectation of success in basic skills, the use of drill, and equal opportunity for responses from all students with a high probability of success in responding. (p. 124)

One of the problems associated with an overemphasis on a particular setting or technology-based delivery system is the lack of flexibility in alternatives generated by this partisanship. As we (Hofmeister, Engelmann, & Carnine, 1985) searched for ways to implement the effective teaching research, we ended up with combinations of settings. One arrangement that has proven very effective in accommodating a range of individual differences is listed in Table 2. In this arrangement the needed learner experiences provided the basis for selecting the lesson and classroom structures. During the first two segments, the teacher spent virtually all the time moving among the students, while using the remote control to direct the videodisc presentations. During group instruction, imbedded testing and decision points required at least 80% of students to be at mastery to allow the group to move

ahead. During the last segment, which was more individualized, the average and above average students received independent practice, while the teacher provided additional guided practice to low achievers identified in earlier lesson segments. In this last segment, at least one-third of each lesson was set aside and systematically planned as a "safety net" for low achievers. This daily safety net was complemented with a weekly safety net. In this weekly safety net, every fifth lesson was a review lesson initiated by a diagnostic test of individual student mastery, followed by the reteaching generated by the results of the test of student mastery. Lesson structures of the type just described reflected a clear concern for students as individuals without having all instruction delivered through individual teaching (Hofmeister & Lubke, 1990).

Insert Table 2 about here

Conclusions

We have made major advances in our understanding of the characteristics of effective instruction, and there appears to be no support for emphasizing such global descriptors as "group teaching" or "individual teaching" to describe the salient aspects of an instructional treatment. What is even more incomprehensible is the practice of advocating treatments that carry considerable organizational, fiscal, and even ethical costs, without a serious analysis of the important instructional variables that operate in that setting. We can no longer accept the assumption that the presence of group teaching means the absence of individualized instruction or that the presence of individual teaching means that individual needs are being met.

Those special educators who respond to IEP requirements to identify interventions with statements such as "Two hours per day in the resource room" have not defined an instructional intervention; they have only defined a location for instruction. Those vendors of computer hardware, who stridently advocate CAI because of its media attributes, do both the technology and the instructional process a considerable disservice. The value of a technological intervention will depend on the quality of the instructional methodology and the curricular organization prompted, carried, or supported by the technology.

Technological teaching tools can make a substantive difference in the quality of education if they serve to capture, crystallize, and disseminate the essence of the teaching profession, namely, the practices of effective teachers. Likewise, interventions in special education will provide much more value and much more relevant instructional information for program improvement when the salient variables in the instructional process are the center of attention.

Research concerned with the conceptualization of individual differences in terms of entering static personal characteristics and learning styles has not yet generated the practical returns hoped for by advocates of such approaches. In contrast, the effective teaching research literature has provided a source of individual differences with instructional relevance. Examples of such relevant, individual differences would include (1) the degree of mastery of prerequisite skills brought to, and new content taught in specific lessons, (2) the amount of guided practice needed before independent practice can be initiated, and (3) the amount and nature of feedback needed to ensure effective reteaching rather than just error recognition. Because these individual differences are dynamic and often directly related to the nature

and quality of instruction, the total instructional process has to be driven by the constant monitoring of individuals and the associated adaption of instructional experiences supplied in group and individual teaching settings.

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Table 1

Major Teaching Functions

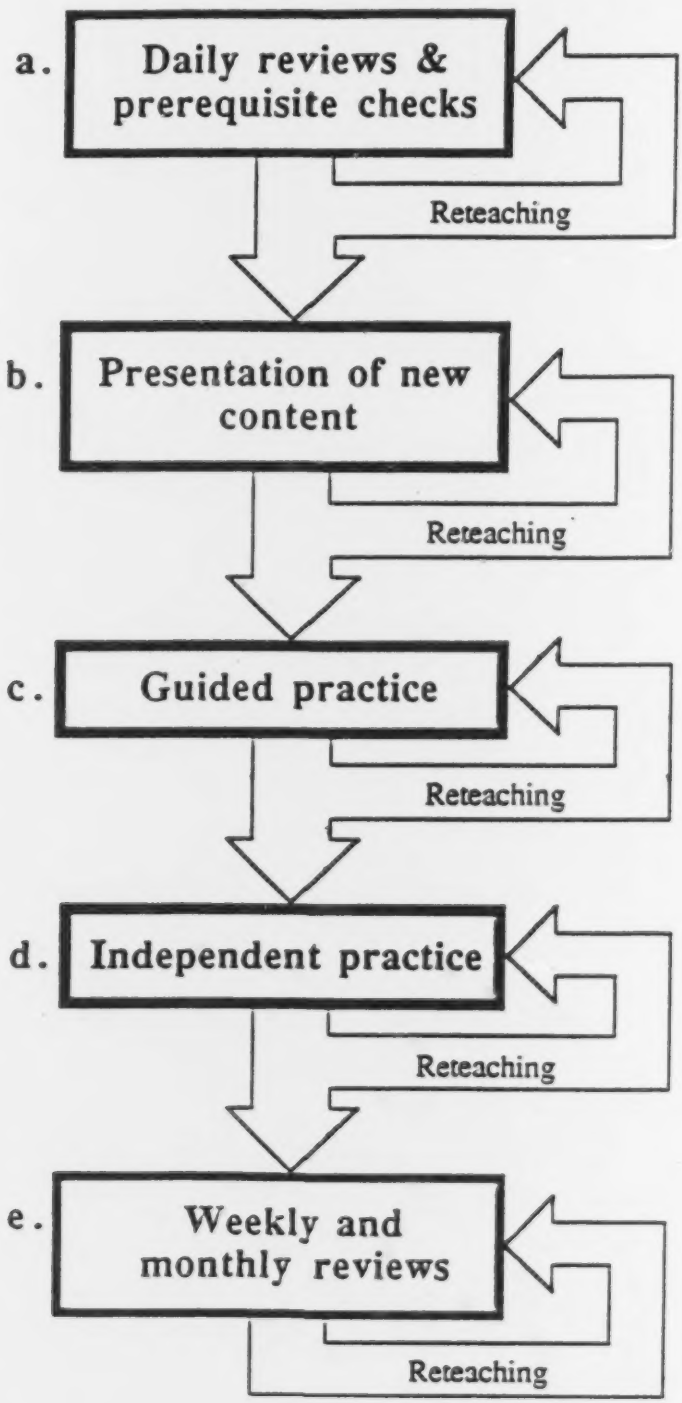

Table 2

Example of a Lesson Schedule

Lesson Segment	Time	Instructional Setting	Learner Experiences
1	5-10 minutes	Group/videodisc	Review and check on prerequisites.
2	20-25 minutes	Group/videodisc	Presentation of new content integrated with guided practice.
3	20-25 minutes	Individual with workbooks	Independent practice for average and above-average students. Additional guided practice for low achievers.

Aptitude-Treatment Interactions: Bad Rap or Bad Idea?

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Running Head: ATI: Bad Rap of Bad Idea?

Abstract

The role of individual differences in special education research and practice is examined through analysis of Aptitude-Treatment Interaction methodology (ATI). Each component of the design is assessed with regard to problems with current conceptualizations and possible solutions. The general themes expressed are that the heterogeneity of participants and interventions need to be addressed and that more attention is due to psychological interactions as compared to statistical interactions. The conclusion is that new life may be breathed into the fundamental, but battered, concepts underlying ATI by using multivariate and transactional approaches.

Aptitude-Treatment Interactions: Bad Rap or Bad Idea?

"The reports of my death are greatly exaggerated."

Mark Twain

As the title of this paper suggests, it was with some ambivalence that I approached the task of assessing the role of individual differences in special education through Aptitude-Treatment Interaction research (ATI). However, as the opening quotation suggests, the usefulness of the ATI paradigm with respect to individual differences may not be as grim as we have been led to believe. Critics of ATI appear to outnumber proponents in the literature and are certainly provided with ample ammunition to dismember the A, the T, or the I from the acronym depending on the particular perspective. Proponents usually acknowledge the difficulties but remain undaunted by the enormity of the task.

This allegiance to the ATI concept seems to stem largely from the logic and intuitive appeal of the belief that not all students will learn from the same methods. It is this logic that fuels special education and compensatory education programs (Corno, 1988). The question posed here is whether or not the model is viable enough from

conceptual and methodological perspectives to warrant continued efforts.

Critics make their position quite clear. A sampling of quotations provides an indication of the strength of their conclusions:

> "...we are unable in the face of evidence... to let go of the grossly unfulfilled promise of aptitude-treatment interaction" (Rettinger, Waters, & Poplin, 1989; p. 309).
>
> "interactional research ... is, essentially, a misplaced attempt to resolve some obdurate theoretical-conceptual problems a-theoretically" (Violato, 1988, pp. 4-5).
>
> "ATIs may be hard to find, apply to a few people in rare settings, be unstable over time, and be irrelevant to instruction" (Ragland cited in Violato, 1988, p. 17).

and finally,

> "In theory, the number of possible ATIs is limited only by the capacity to generate learner characteristics and related educational programs" (Fuchs & Fuchs, 1986, p. 199).

The latter statement was developed in the context of a meta-analysis of the achievement effects associated with systematic formative evaluation. From this perspective, Fuchs and Fuchs (1986) summarized four major problems of ATI investigations: (a) our knowledge of students' cognitive abilities is incomplete; (b)tests of aptitudes do not have adequate technical characteristics; (c)test administration

procedures may produce biased results for individual children; and (d) our knowledge of all possibly important interactions among students, teachers, environments, and interventions is at best, incomplete (Fuchs & Fuchs, 1986).

Fuchs and Fuchs found impressive evidence in support of systematic formative evaluation that was not tempered by students' age, treatment duration, measurement frequency, or status as handicapped. While their criticisms of ATI have more than a ring of truth, invoking the problems of ATI research in this context seems analogous to erecting a straw man. While the results of the meta-analysis were impressive, formative evaluation does not appear to address what teachers actually do between assessment points. That is, the measurement system alerts teachers that a particular instructional method is not producing the desired goal and that a change is necessary. The data indicate that teachers heed this signal and modify instruction to the benefit of the child. It is not clear, however, what these changes consist of and why they work. An ATI investigator presumably would be (or should be) interested in understanding the latter issues, particularly the store of instructional modifications held by the teachers and how and when they are applied. If it is the case that this fund of knowledge simply needs to be triggered systematically, then one could argue that ATI research is peripheral to the advancement of instructional psychology. If, however, one is also

interested in the psychology of learning, these questions merit further attention. Tobias (1982) has argued that a merger of efforts between instructional and learning psychologists is necessary to the development of more fruitful ATI research.

A second problem with the general arguments against ATI has to do with the substantive issues addressed by ATI research in special education. The logic of ATI cannot be judged by research on modality preferences, visual perceptual interventions, or treatments derived from the ITPA (Reynolds, 1988). The difficulties associated with these types of inquiries are not indictments of ATI but rather of the weak conceptualizations of learning problems postulated by the investigators. The issue, of course, is the separation of the substance of the study from the design chosen to test it.

The tension created by critics and advocates can be recast into the classic psychological debate between idiographic and nomothetic approaches in behavioral sciences. The nomothetic approach champions the identification of universal laws that capture behavior of all persons. Nomothetic also has been equated with "simple-minded". On the other hand, the idiographic view eschews generalizations as they are impossible to apply at the individual level. Idiographic is synonymous with "muddle-headed".

The challenge with regard to individual differences and special

education is to arrive at some middle ground between muddle-headed and simple-minded that might be regarded as "clear thinking". As stated more elegantly by Vale and Vale (1969),

> ... some resolution is had when it is understood that individual differences must, necessarily, be the business of all psychology, because there appears to be little opportunity for psychology to become a science of general laws without systematically including individual differences in the search, and general laws are the business of all psychology. (p. 105)

The extent to which ATI methodology serves to advance this understanding is considered next by describing the problems with each component of the ATI framework and possible solutions.

Aptitudes

Aptitudes are broadly conceived in ATI research and are not necessarily confined to standardized tests of achievement or intelligence. Corno and Snow (1986) noted that, in general, individual difference studies in the ATI context fall into three categories: cognition, conation, and affection. They further stated that these divisions are artificial in that aptitudes must be interrelated but little progress has been made in analyzing combinations of aptitudes. One question is, how many individual differences are needed? As succinctly stated by Cronbach (1975) "Once we attend to interactions, we

enter a hall of mirrors that extends to infinity" (p. 119).

In addition to how many is the problem of which ones? We can find evidence of interactions with aptitudes as diverse as attributional style of fifth graders (Licht & Dweck, 1984) and receptive language ability of low-moderately to severely retarded adults (Egan, Gersten, & Irvin, 1986). The study of attributional style by Licht and Dweck showed dramatic differences in achievement for children with a "helpless" orientation when confronted with straight-forward vs. confusing material. Egan, Gersten, and Irvin (1986) demonstrated that severely retarded adults with higher receptive language skills were more likely to meet task criteria with specific rather than general instructions. While each of these studies must suffer criticisms associated with univariate analysis, the instructional implications may be worthy of further consideration.

Even when interactions are identified, the aptitudes are narrowly conceived. For example, prior knowledge is generally measured by standardized achievement or criterion-referenced measures. Goldman, Pellegrino, and Mertz (1988) recently demonstrated that such measures are inadequate to tap the prior knowledge construct within a group of children identified as learning disabled. Although the study defies a simple description, Goldman and her colleagues found that posttest performance was a function of the strategies the children exhibited

during pretest measurement. They were able to identify four distinct strategy groups that would have been masked by a more global assessment system.

Other problems with aptitudes include heterogeneity of treatment groups and the adequacy of measurement instruments to capture differences at the level of the individual (Phillips, 1985). Problems with measurement are more apparent and will not be elaborated (see Fuchs & Fuchs, 1986). Heterogeneity deserves some attention with respect to both applied and research issues in special education.

In the usual ATI design, the interest is in the performance of the more extreme groups, generally low and high achievers. Given that there are many correlates of global achievement, these groups are necessarily heterogeneous. To the special educator, the finding of a significant ATI in these types of studies is of little interest since the special educator's focus is on the heterogeneous low achiever group and the differential responses of these children. The general educator may be similarly unimpressed when extreme groups respond differently if the children composing these groups represent only a fraction of the participants. The issue is that ATI researchers, by failing to address sample heterogeneity, have little to take to the bank when the tellers are teachers.

Although it would seem reasonable to do so, very few ATI studies

have been conducted in the past decade in which students with learning problems have comprised the entire sample. It is impossible to determine if this reflects a lack of interest or whether the studies are failing to produce significant ATIs and hence, are not considered publishable. Of the published ATI studies, Pascarella, Pflaum and colleagues (Pascarella & Pflaum, 1981; Pascarella, Pflaum, Bryan & Pearl, 1983) have demonstrated that aptitude construed as attribution for effort interacted with teacher control of errors for two separate samples of poor readers, some of whom were labeled as learning disabled. Yoder, Kaiser, and Alpert (1989) measured language skill improvement in preschoolers with handicaps who were assigned to one of two interventions. Although appropriately cautious in drawing their conclusions, Yoder et al. found that variation on multiple pretest variables consistently related to children's ability to profit from a particular treatment.

These investigations, by focusing on only one segment of the population, narrowed the range of student characteristics and still found significant ATIs. This subject selection strategy may be one of the more useful approaches if ATI research is to impact practice in special education. Although the groups studied may have exhibited within-group variance on any number of aptitudes not measured, that the investigators selected the "right" ones was not a matter of chance but

rather evolved from careful consideration of theoretical issues.

Aside from heterogeneity, two outstanding issues remain with respect to aptitudes. The first is that evidence for individual differences is correlational and not necessarily predictive at the level of the individual. The second is that aptitudes are construed as within-child phenomena that are not subject to environmental influences, treatment conditions notwithstanding.

With respect to individual differences and correlations, a reasonable strategy in regard to "which ones", would seem to be selection of variables that have enough stability to be predictive of the desired outcome. While longitudinal studies of this type exist, Speece & Cooper (in press-a) recently demonstrated the fallacy of classification models that use the "hit rate" approach to predicting outcomes at the extreme end of distributions. It was shown that otherwise impressive hit rates are offset by an analysis of the hit rates one could achieve by chance. Additionally, these types of studies ignore what happens to the child between data collection points. Thus, prediction studies that encompass long time periods may not be useful in selection of aptitudes. This point was well illustrated by Burns (1980) who studied four composite cognitive aptitudes and their relationship to daily achievement measures administered after instruction. Differential relationships were obtained between aptitudes and achievement across the

four day sequence. This finding not only assists our understanding of unstable ATI results but also emphasizes the changing nature of the learner as a consequence of instruction. Burns (1980) hypothesized that separate aptitudes may be required for the content and method of instruction.

Burns' (1980) data also address the second problem, adherence to deficit models of child variance. This approach ignores the data on reciprocal influences between child and environment. Hunt (1975) noted that the only interaction recognized in ATI research is statistical, not person-environment. That is, ATI research ignores the psychological interaction between participants (teachers, students), content and methods, and the resulting and continuing influence on outcomes (achievement). ATI proponents may argue that the "T" captures at least part of this complexity. At best, only the surface has been scratched and this is probably too generous of an estimate. Hummel-Rossi (1981) demonstrated how much can be missed by not examining teacher-student interactions. She showed that teachers created different environments for students which were appropriate for the students' personality characteristics. This seemingly good match was offset by the finding that differential achievement occurred related to the teacher-student pattern of interaction.

Capturing this complexity as a single variable is a challenging

task. For example, ratings of classroom behavior tap the interaction between the child's behavior and the teacher's interpretation of the behavior but the influence of each component is impossible to separate without further evidence. As an attempt to measure the interaction between the child's response and instruction, two measures from a dynamic assessment instrument were incorporated in a multivariate classification study (Speece & Cooper, in press-b).These data appeared to provide meaningful differences across the identified subtypes that were not redundant with more usual measures of aptitudes (intelligence and achievement). The point is that the aptitude net must be cast more broadly to acknowledge the complexity of instructional environments and the participants.

A final recommendation comes from proponents of ATI. Snow (1984), Corno and Snow (1986), Reynolds (1988), and Tobias (1981) have all argued for a multivariate approach to the study of aptitudes with specific attention to the development of aptitude taxonomies. The development of taxonomies addresses intercorrelations among aptitudes as well as the heterogeneity of treatment groups. It does not address selection of aptitudes; guidance here can only come from theoretical orientations to the problem. In the context of cognitive development, Pellegrino and Goldman (1983) noted that theories and models of performance must explain group and individual differences at the level

of the individual. This is a tall order. In addition, pursuit of taxonomies does not address how many aptitudes are necessary. A set of 12 classification variables was used in the previously mentioned classification study (Speece & Cooper, in press-b). While this approach does address aptitude correlations as advocated by Corno and Snow (1986), these same authors also reviewed evidence which indicated that teachers typically rely on only two aptitudes for instructional decisions, ability and motivation. Whether this is due to the truth of the situation, sparse information, or cognitive overload is an issue for further study.

Treatment

Many of the criticisms of aptitudes apply equally to treatments. Phillips (1985) suggested that aptitudes have received disproportionate attention to the detriment of instructional variables. MacMillan, Keogh, and Jones (1986) echoed this concern with regard to our knowledge of children's performances on laboratory tasks as compared with our knowledge of teaching.

Analyses of what seems to be going on in regular and special education classrooms for mildly handicapped children is certainly disturbing as documented by Haynes and Jenkins (1986) and Leinhardt, Zigmond, and Cooley (1981). The situation becomes more complex when we superimpose the current Zeitgeist associated with prerefferal committees

and the Regular Education Initiative (REI). The practice of special education in the schools appears not to be informed by Snow's (1984) caution against embracing panaceas. While either policy may prove effective, the packaging of general concepts such as prereferral and REI as treatments overstates our knowledge of their ramifications for children with handicaps (e.g., Fuchs & Fuchs, 1988).

The point is not only that, as usual, practice is preceding research (Baumeister, 1981) but also that our treatments are not specified very well. Interventions that appear well-specified suffer from unspecified within-group variance. It may come as no surprise that those who advocate taxonomies of aptitudes also emphasize taxonomies of instruction (e.g., Corno & Snow, 1986; Phillips, 1985). Corno and Snow (1986) identified "instructional mediation" as a key to their taxonomy, a position that would find support in many quarters (e.g., Palincsar & Brown, 1984; Stone, 1985; Turnure, 1985). They carefully pointed out that issues of what kind, how much, and how long, remain to be addressed. It should also be mentioned that the concept of instructional mediation implies a two-way street, thereby blurring distinctions between A and T.

In a similar vein, Good (1988) encouraged researchers to do more observational research that focuses on the quality of instruction as opposed to the quantity. Tobias (1982) suggested that analyses of how

students process information during different types of instruction would be a more fruitful approach than a focus that only defines external differences between instructional methodologies. Peterson and Swing (1982) provided relevant data on this point in their investigation of student-reported cognitions during classroom instruction. Yoder, et al. (1989) developed a thought provoking discussion, with respect to cognitive and linguistic factors, on why certain types of children benefitted from each of their instructional methods. Thus, it appears that the ideas of instructional mediation, quality of teaching, and level of students' cognitive activities are beginning to be addressed in research on individual differences and instruction.

These themes are also sounded in ethnographic research, a perhaps unlikely source for ATI researchers. Heath (1983), in a study of culture and language, demonstrated aptitude-treatment interactions although her mode of presentation did not include figures of disordinal interactions. As important is Heath's description of change in classrooms as a function of both child and teacher movement, not simply "doing something" to the child. Hermine and Weinstein (1985) provided a vivid comparison of the environments of two classrooms that differed with respect to whether students perceived high or low differential treatment from teachers. Fraser and Tobin (1989) blended qualitative and quantitative methods to describe the different environments that existed

within classrooms. The point is not that every study must address all the nuances associated with different interventions. Rather, the extant ATI research, for the most part, has been implicitly searching for general laws without much attention to the contribution made by individual differences in responses to instructional environments and the corresponding impact on learning and the participants (Hunt, 1975; Vale & Vale, 1969).

Interaction

The differences between statistical and psychological interaction were described earlier and will be elaborated below. There are important statistical issues that are not uniformly addressed in ATI research. For example, methods exist to identity regions of significance that go beyond interpretation of F ratios (Cronbach & Webb, 1975; Serlin & Levin, 1980). Determining regions of significance allows the investigator to identify aptitude confidence intervals for which the treatments were particularly effective. These procedures allow both the practitioner and researcher to determine how extreme a child must be to benefit from the treatment (e.g., Corno, 1980; Pascarella & Pflaum, 1981).

A second issue is selecting the appropriate unit of analysis. Generally, individuals pooled within treatment groups are used as the unit, ignoring within- and between- classroom effects (Cronbach & Webb,

1975; Levin & Peterson, 1984). Cronbach and Webb (1975) demonstrated the danger of this error in a reanalysis of data in which an ATI found in the original report was not apparent when class was taken into account. Swing, Stoiber, and Peterson (1988) separated the classroom effects and essentially found opposite results when viewing the data within and between classrooms.

Although the results of the latter study were puzzling, some insight was gained by rereading Sameroff's (1975) classic paper on the continua of reproductive and caretaking casualty. In this context, he discussed the inherent limitations of main effect and interactional models of child development. The major problem is failure to account for the changes that accrue through the interaction between child and environment. Some acknowledgement of the necessity of a transactional model can be found in the educational literature on ATI but the discussions are incomplete (Corno & Snow, 1986; Cronbach, 1975; Phillips, 1985).

For example, it is not clear how transactions can best be captured nor what to do with them. Following Burns (1980), one approach may be more frequent measurement and analysis of statistical interactions. Phillips (1985) recommended the adoption of more complex, bidirectional designs and offered structural equation modeling as a possibility. It remains to be seen whether regression models can capture complex topics

like iatrogenic retardation (Kearsley, 1979)) or cultural conflicts between home and school. As an example of cultural issues, Teelucksingh (1988) described differences between Hispanic communities and the special education system on the definition of handicap. In the Hispanic households, handicapped meant dysfunctional, that is, crazy or unable to go to work or school. Handicapped was not a term that applied to a child who was able to read a letter to her mother that requested parental attendance at an IEP meeting. A quote from one of the Hispanic participants is insightful, "In America, everyone is handicapped".

This type of information does not fit neatly into current conceptualizations of ATI. However, to ignore its existence is to ignore variance that I have argued needs to be captured at both the aptitude and treatment levels. Cross and Paris (1988) used a novel application of the ATI design by defining aptitudes as multivariate subtypes and then testing the effects of intervention. Although some aspects of the study are troubling from treatment and analysis perspectives, of interest is the evidence of differential intervention effects for two subtypes of poor readers at two grade levels. The use of empirical classification techniques provided a method of more finely discriminating among the skills of children that adherence to high achiever - low achiever dichotomies cannot handle. The suggestion to pursue classification efforts will be disturbing for those who do not view such activities as

adding to our understanding of teaching children with handicaps (Forness, 1988; Rettinger, Waters & Poplin, 1989). However, it remains a viable empirical question, (Speece & Cooper, in press-a).

In the analysis of both strengths and weaknesses of ATI research and philosophy, one source of difficulty may be that both producers and consumers of ATI research expect too much from these studies as currently designed. Is it reasonable to believe that this framework can simultaneously inform both practice and theory? Some critics base their objections on the failure of ATI research to produce direct applications for the classroom. There are few data that ATI researchers can use to deflect this criticism. However, the extant data have provided refinement of our knowledge of some individual differences and some instructional methods even though the difficult questions of psychological interaction remain.

In answer to the question posed in the title of this paper, do criticisms of ATI represent a "bad rap" or is ATI a bad idea, it appears that the underlying concept hasn't received an adequate test. Real life ATIs are transactional, multivariate, and developmental. This complexity needs to be reflected in our research before we can begin to understand school failure. Fleishman (1982) aptly summarized the situation, "... if nature is more complex than we would like it to be, we need to take steps to organize and conceptualize it in ways which make it more manageable" (p. 832).

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Individual Differences and Individual Difference: The Essential Difference of Special Education

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Running Head: DIFFERENCE OF SPECIAL EDUCATION

Abstract

The current Aptitude-Treatment Interaction (ATI) approach to accommodating individual differences has not proved instructionally useful. In this paper, reasons for this failure are identified and considered, and the desirable characteristics of an alternative model are identified. Formative evaluation is offered as a promising alternative that addresses individual uniqueness rather than dimensionalized individual differences. The notion that the failure of ATI research to be practically useful in designing instruction justifies ignoring individual difference is rejected.

Individual Differences and Individual Difference: The Essential Difference of Special Education

"Every individual is unique."

"People are the same the whole world over."

The above quotations are presented by Kimble (1989) as seemingly contradictory truths widely held to be common sense. The ideas embodied in those quotations clearly and simply frame the issues addressed here. In this paper I take the position that "every individual is unique" and that the essence of special education is to provide for that uniqueness.

In presenting the case for the importance of individual differences in special education programming, I would like to make three points: First, the proposition that different students respond differently to the same instruction is unquestioned. Second, the failure to be able to usefully apply our knowledge regarding individual differences to instruction is a failure of both the available technology and an overemphasis on the traditional diagnostic - prescriptive teaching model. Third, since the legal and moral responsibility to design programs for individuals is clear and unquestioned, an alternative model and technology for individualizing instruction is required. The present paper is organized around these three points.

Differences in Individual Response to Instruction

More than twenty years ago, Robert Gagne (1967) edited a book entitled, Learning and Individual Differences. That book was a product of a conference held in 1965 to address the status of our knowledge and research on the role of individual differences in learning and instruction. Twenty-two years later,

Ackerman, Sternberg, and Glaser (1989) edited a book with the same title based, again, on a conference focusing on that topic. Many of the contributors to the 1967 volume were also contributors to the 1989 volume.

Two themes emerge clearly from reading through the two volumes. One is that the research community in academic psychology views the relationship between learning and individual differences to be a topic as important now as it was twenty years ago. Unfortunately, the second theme is that our knowledge of how to systematically design instruction to accommodate individual differences has not progressed much in twenty-two years. These two themes, I think, are most clearly seen in a series of quotations by Richard Snow (1989) from a Chapter in the second book entitled, "Aptitude-Treatment Interaction as a Framework for Research on Individual Differences in Learning":

1. "Learners differ profoundly in what they do in learning and in their success in any particular learning situation." (p. 14)

2. "The science of human behavior is built up by identifying a class of persons who responds similarly to some range of situations." (p. 16)

3. "Aptitude-treatment interactions exist." (p. 21)

4. "There are many complex combinations...{that} push conventional, theoretical thinking and statistical methodology to the limit." (p. 21)

5. "No particular aptitude-treatment interaction hypothesis has been sufficiently confirmed or understood to serve as a basis for instructional practice." (p. 22)

In the first quotation Snow expresses as indisputable the proposition that learners are differentially responsive to different types of instruction. At the same time, this quote asserts nothing about either the paradigm we should use to think about this proposition or the methodology to be used in attempting to conduct research on the implications of this proposition for education. The quotation simply asserts what most of us already believe - individuals are unique. This uniqueness, then, forces upon us the need to consider how instruction can be designed to accommodate individual uniqueness.

The second and third quotations, in contrast to the first, relate more directly to the title of Snow's Chapter and begin to impose upon us a way of thinking about how to measure and accommodate individual uniqueness in instructional design. The emphasis in the second quotation is upon classification of both persons and situations. Like the opening quotations from Kimble, this emphasis on classification actually contradicts the assertion of individual uniqueness, since it suggests that different individuals can be placed together in a group where their individual uniqueness does not interact with different sets of learning experiences. Why should such seemingly contradictory statements be made? The answer to this question can be found in the philosophy of science. The second quote represents the nomothetic approach to science that "...seeks to establish abstract general laws for indefinitely repeatable processes" (Nagel, 1953, p. 688). The primary aim of nomothetic sciences is to establish general laws. As Snow's statement makes clear, an aim of psychology is to establish generalizations regarding the relationship between environmental variables that we call treatments and

changes in behavior. These are the "infinitely repeatable processes" referred to by Nagel. In the form articulated by Snow, psychology is nomothetic, and classification is essential.

Natural sciences which are nomothetic, can be contrasted with historical approaches to knowledge where the goal is to make supportable assertions about single events rather than to create and empirically verify general laws (Nagel, 1953). Historians use generalizations from the natural and social sciences to explain the occurrence of individual events, but they do not assume as their primary goal to establish or create new generalizations regarding repeatable events. Thus the approach to understanding taken by historians is referred to as idiographic --- "individual description."

The distinction between nomothetic and idiographic approaches to explanation will be considered later. The important point here is that the aptitude-treatment interaction (ATI) model referred to in Snow's third quotation is based on a nomothetic approach. It is clear from this quote that the ATI research from the past ten years has established the existence of a number of general laws regarding the relationship between individual differences and environmental treatments. As revealed in the fourth quotation, however, the theoretical and methodological problems asociated with those empirical generalizations are so great that no particular ATI relationship can be applied in instructional design. Accepting the truth of Snow's fifth proposition we are left with the question, "If we can't practically apply what we know to be true, is it defensible to ignore individual differences in special education?" I think the

answer to this question is "no," but the solution to this practical problem requires some analysis.

The Practical Problems Associated with ATI's

Why it is that after twenty years of research we should conclude that while ATI's exist, we are not far enough along to practically apply the knowledge of those ATI's to instruction? Consider, first, the methodology of ATI research. That methodology is based on integrating the correlational and experimental approaches to scientific psychology as described by Cronbach (1957) in his presidential address to the American Psychological Association. The correlational approach of the ATI paradigm relies heavily upon the use of measuring individual differences as a basis for establishing generalizations regarding the relationship between individual characteristics and performance differences. In contrast, the experimental approach has emphasized manipulation of independent variables in controlled situations to establish generalizations about the relationship between variations in the environment and performance differences. In his paper, Cronbach argued that the two approaches could be combined to enable generalizations regarding the differential effects of treatments for groups of individuals who were at similar points on a dimension of individual difference. In research design terms, of course, Cronbach was arguing for ATI research.

The ATI concept has been easy to embrace. Rare is the researcher or educator who doesn't believe that the individual differences of students play a very large and significant role in determining the effectiveness of a particular treatment or educational program. Why, then, the failure to practically apply ATI

research to educational programs? Several possibilities come to mind. First, the relationships identified through ATI which are, at best, modestly evident in well controlled research environments may be vitiated within the less controlled classroom environment. A second possibility is that the tests that have been developed and are used to scale static behavioral differences (i.e., traits) may be insufficiently reliable and valid measures for predicting what may be dynamic changes in those behaviors as they interact with treatments. A third plausible reason for the practical failure of ATI's is that we are incorrectly assuming that available tests can be used to reliably and validly classify individuals into groups that are homogeneous with respect to those characteristics that interact with treatment variables. Not only may our current tests be insufficiently reliable and valid for instructional design, but also any combination of tests very likely provides an insufficient snapshot of a limited set of individual characteristics at any moment in time.

The practical limitations of the ATI approach are not recent. Glaser (1967) in tracing the history of research on individual differences quotes Lindsay and Margenau who provide a metaphor from physics to illustrate the importance of knowing more about the individual's history than can be captured at the current moment through measurement of the current state:

> ...consider a fiber which is twisted from its normal equilibrium configuration by the application of torque. When released it displays the familiar phenomena of elastic fatigue and hysteresis. This means that a knowledge of the state of twist and angular velocity of

> the fiber at any instant is not sufficient for a prediction of its state and motion at any subsequent time. Rather, we need for this purpose the whole history of the fiber since first it began to move at all; that is, we must know its heredity. The name heredity mechanics has been given to the field of problems into which they enter what are essentially boundary conditions extending over continuous intervals of space and time and demanding integrals for their representation." (p. 14)

Glaser goes on to point out that studies of the effects of individual differences in learning must take into account the history of the individual well beyond that ordinarily captured in the test scores obtained from individuals at a moment in time.

What seems clear from reading a current research on ATI's is that general laws are difficult to obtain, and that the traditional diagnostic-prescriptive teaching approach upon which P.L. 94-142 rests - is technically infeasible. Indeed, while we talk a great deal about diagnostic procedures in special education, the use of those procedures very likely rests on superstitious tradition. Essentially the same point was made some years ago by Ysseldyke and Salvia (1974), when they argued that the traditional diagnostic-prescriptive approach to teaching was akin to experimentation without informed consent. Given the state of our research on ATI's, it is no wonder that we should be questioning the relevance of individual differences in special education. The

irony is, however, that the ethos of special education requires attention to the needs of individual students. How do we find our way out of this dilemma?

Programming for Individual Difference: An Alternative Model

Resolution of the dilemma created by admission of individual differences on the one hand, and the inability practically apply ATI research findings, on the other, requires solutions to three practical problems inherent in the ATI procedures used to individualize instruction. Those problems are: 1) an overemphasis on the importance of predicting/prescribing programs from diagnostic testing procedures used prior to implementing the program; 2) a tendency to assume that probabilistic predictions that are reasonable for groups apply with some certainty to individuals within the group; and 3) an underemphasis on the importance of systematic procedures for evaluating progress and adjusting operational predictions that prove to be inaccurate. Together, these problems make the ATI instructional technology insufficiently responsive to individual difference.

When considering that ATI research originated from efforts to make personnel placement decisions (Snow, 1989) it is not surprising that the technology that has developed might be unresponsive. Since the primary goal of the professional psychologist in personnel placement is matching the individual to a program, the primary technological problem is creating a test that is sufficiently valid to predict that an individual will be successful in the occupation or program. Since the person using the test and recommending the placement generally has very little to do with the either the circumstances of the job or the nature of the program after the placement has been made, the

decision emphasis is on the importance of the initial prediction. Whatever happens after placement will be someone else's problem to solve. In similar fashion, the emphasis in special education has been on initial planning and placement with an inordinate amount of time and energy spent on those activities. The people involved at the "front-end" of program planning and placement (i.e., the school psychologist, diagnostician, etc.), then, see individual difference testing as a critical part of what must occur in order for programs to be successfully delivered. Very often the team of individuals designing those programs and making predictions about what kinds of services are required has very little to do with actual program implementation. Team members view that to be the special teacher's responsibility. Since we all like to see our own work as vital, the tendency has been for those people responsible for initial program planning and placement decisions who must make predictions from diagnostic information to reify the diagnostic and prediction process.

The second characteristic of the ATI approach to instructional design that makes it less responsive is that it relies exclusively on the generalizations of nomothetic psychology. Certainly, the nomothetic approach is appropriate for a scientific psychology that seeks to develop generalizations regarding human behavior. At the same time its aim is less appropriate for education than idiography that seeks, in Ernest Nagel's (1952) words, "to understand the unique and nonrecurrent". Nomothetic sciences like physics contrast sharply with history where the aim is not to establish general statements, but rather to make "warranted singular statements about the occurrence and interrelations of

specific actions ;. 689). In like fashion, medicine and geology are idiographic while physiology and physics are nomothetic sciences. Nagel points out that physicians conducting medical diagnoses and geologists seeking to establish the order in which certain geologic formations occurred use the laws of physiology and physics respectively to develop their explanations; however, they do not take on as their primary task the establishment of such laws. Nagel makes clear, however, that while the aims of the two approaches differ, the general patterns of explanation in historical inquiry and the conceptual tools used are the same types of explanations and same as used in the nomothetic companion science. Thus, we could expect that special educators would draw upon the concepts and procedures of scientific psychology to understand why an individual was performing in a particular manner at any moment. At the same time, the work of the special educator requires recognition of the "unique and nonrecurrent" nature of an individual's interaction with a particular instructional environment at a given moment, and operation based on that singular rather than general case.

The difference between the general case approach of nomothetic science and the individual case approach of idiography carries over to the second practical limitation of the ATI model - assuming that generalizations that are true for groups apply equally well to all members of the group. The problem with making individual predictions is illustrated in a statement made by Stella Sharp in 1898 and quoted by Glaser (1967):

> "the time necessary to fix impressions in memory increases at first proportionately to the number of impressions; but,

> after a certain limit, the 'time of acquisition' increases more rapidly than the number of impressions. This law of memory is common to all; no one can escape it; the law does not say that the limit...is fixed and common for all." (p. 2)

Sharp makes the point, that while the general law applies to all individuals , one aspect of the law (the "limit" beyond which there is a proportional relationship between time and the number of impresssions) does not apply equally to all individuals. This problem of making predictions about individual cases from generalizations that may be true for groups is illustrated further by predictions regarding traffic fatalities made holiday weekends in the United States. While predictions of the number of people dying on the highway are often quite accurate, they are essentially useless in the individual case. When planning my holiday weekend, for example, I need to know whether I am the one who will die if I take to the highways. General policy decisions can be made on such group information but specific programming decisions cannot.

The limitation of applying probabilistic statements that are true for a group to individual performance is well illustrated in the results of a study we conducted some years ago in the Minneapolis Public Schools Special Education program.[1] The research involved approximately 120 students being taught by 30 different teachers. Each teacher collaborated with at least two other teachers in creating and implementing two contrasting approaches and testing their effects with their students. We asked teachers to contrast two different approaches of their own choosing with each of four students on their caseload. While implementing the two approaches, teachers collected

Curriculum-Based Measurement data two to three times per week on each student and the rate of improvement in reading performance during each teaching approach was determined by drawing a line of best fit through the graphed data. An illustration of this comparison showing only best fit lines for two students can be seen in Figure 1. As is clear in the figure, the relative differences in the effects of the two different approaches are quite opposite

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Insert Figure 1 about here

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for the two students. The results are even more dramatic when one considers that these two students are being taught by the same teacher at the same time. Eight different experimental contrasts were created and implemented by the teachers. In Figure 2, the results of these eight contrasts are presented.

Insert Figure 2 about here

Each of the contrasting approaches is also compared to the baseline approach, the approach used by the teachers prior to the research. As is evident in Figure 2, mean differences were obtained for the different approaches suggesting that, on the average, one approach was better than the other. If we examine Figure 3, however, we see a Figure for one of the contrasts that reveals how the results differed for different individuals. Figure 3 represents the percentage of students in each group (rather than the mean) whose slope of improvement was steeper under each approach. As can be seen, some of the students did better under

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Insert Figure 3 about here

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one instructional condition, some students did better under the other instructional condition, and for some of the students neither instructional conditions produced a higher rate of growth. The importance of the data presented in Figures 1, 2 and 3 is that they illustrate how generalizations that more hold true for groups do not necessarily apply to individuals within the group. A quotation from Kimble (1989) clarifies and summarizes this point well: "Every individual is a unique expression of the joint influence of a host of variables. Such uniqueness results from the specific (idiographic) effects on individuals of general (Nomothetic) laws." (p. 495)

A third major problem inherent in the traditional ATI approach that must be overcome is the lack of methodology for adjusting predictions and programs for single events in natural settings. General case predictions may be sufficient for science, but they are not always so for practice. The laws of physics, for example, apply well to making predictions in controlled environments, but the problem of predicting exactly the length of time it will take a leaf to fall from a tree and the precise location of its landing in the natural environment given the vagaries of wind and other climatic conditions makes such singular predictions imprecise. The same thing can be said with respect to meteorology which, in its probablistic statements, can make fairly accurate forecasts about weather in general, but has difficulty making predictions about ground level weather in specific locations because of the circumstances of terrain, temperature and

shifting winds. Making predictions about individual student performance in the classroom is made extremely difficult because of the complex interaction of uncontrolled setting variables, teacher variables, method variables, and student characteristics. Thus an approach to individualizing student performance that must rely heavily on initial diagnostic predictions is one certain to be inaccurate most of the time. Without a mechanism for adjusting programs in progress it will most certainly fail.

Formative Evaluation: An Alternative Approach

The characteristics of an alternative model to the traditional diagnostic prescriptive one are embodied in the formative evaluation approach to building more effective programs. Formative evaluation embodies at least four characteristics important to resolving the problems associated with the traditional ATI approach.

1. The emphasis in formative evaluation is on responsive, data-based problem solving rather than on static diagnosis and prescription. The key characteristic of special education personnel in formative evaluation, then, is flexibility rather than prescriptive accuracy - a characteristic of technicians. Flexible and responsive problem solving requires continuous revision of alternative solution attempts when the data indicate that the problem is not yet solved. Technical work, on the other hand, requires correct and precise execution of particular routines that have been prescribed by someone else. The familiar phrase "operating by-the-book," is one we associate with technicians rather than problems solvers.

An anecdote from my own experience clarifies the distinction between static technical execution of prescribed treatments and flexible, data-based problem solving. Some years ago, the heater in my car was not producing enough heat to live comfortably in Minnesota in the wintertime so I took it to the dealer for service. Later in the day, I received a call from the service people saying that by applying a test to the cooling system they had discovered that I had a leak in my heater. I asked them what this had to do with the fact that I wasn't getting enough heat out of the car and they told me that because of the leak the fluid level was too low; therefore, the volume of heat in the system was reduced and that's why I wasn't getting enough heat. I asked what could be done and they said that the recommended procedure was to replace the radiator core. They replaced the radiator core, but that evening when I drove away from the dealer I discovered that the output of my heater was unchanged. Needless to say, I was irritated. The problem that I had wanted solved was the low output of heat in my car. Instead of problem-solving, they had applied a set of standard, technical procedures that defined a different problem---the level of fluid in my car. I was unhappy because my problem was not solved; whereas, they were certain they had executed their technical procedures precisely as intended and eliminated what they considered to be the problem. This anecdote not only illustrates the difference between problem-solvers and technicians, but also serves as a useful metaphor illustrating how tests come to wrongly define the problems to be solved in special education.

2. A second characteristic of formative evaluation is that it emphasizes development and use of feedback technology for continually

evaluating and changing programs in progress; rather than an improved technology for better program-placement decisions for different types of students. An example is the use of continuous feedback is illustrated in Figure 4. In that figure, data collected across time indicating growth in individual

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Insert Figure 4 about here

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student performance can be fed back to the problem-solver who could use the data to make decisions about the effectiveness of alternative solution attempts. In Figure 4 we see efforts to solve an individual student's reading problem. Initial attempts to increase the student's growth in reading were made in the regular classroom through consultation and modification in curriculum materials. After the prereferral interventions proved to be relatively unsuccessful, direct service was then provided by a learning disabilities resource teacher as a supplement to ordinary classroom instruction. It seems clear from the data that the individual direct instruction in the resource room benefitted the student beyond that provided in the classroom environment. A technology providing continuous feedback of this type fits my conception of a dynamic educational model rather than the static diagnostic prescriptive models that we traditionally use in special education. Of course, all intervention models involve both diagnosis and prescription and continued evaluation. The point to underscore here is that we may have reached the limits of our current diagnostic-predictive methodology, while the extent of improvement that can be

made in individual programs through formative evaluation is as yet undetermined.

3. The formative evaluation approach to individualization emphasizes a person-based conception of individual treatment rather than a test-based conception of treatment. By person-based treatment I am referring to the significant role that the individual teacher must play in day-to-day decision making. For too long, I think, we have acted as if we can create intervention programs that will be equally effective in helping individual students regardless of who delivers that program. I am doubtful that such programs either exist or can be created. In any case, fixed programming is inconsistent with the problem-solving perspective advocated here. Evidence to support the notion that teacher effects are crucial can be adduced from an article by Patterson (1985) entitled "Beyond Technology: The Next Stage in Developing an Empirical Base for Parent Training." In that paper, Patterson describes the results of their efforts to teach parents to more effectively manage their hyper-aggressive children. He makes the point that while they had identified many specific behavior management techniques that parents could use to effectively reduce the rates of deviant behavior, differential success was obtained in teaching parents to use those skills effectively. After careful analysis they concluded that the differential outcomes were a result of the differences in individual clinical skills of the person teaching the parents to use the behavior management techniques. Apparently, the trainers who were working with the parents differed considerably in the clinical skills required to overcome the resistance to learning often found in their clients.

I can't help . . . think of the parallel that exists between Patterson's experience and what we find for most of our special education students. Since our students have a history of failure in schools and are generally resistent either explicitly or implictly to learning what they are being taught, it is likely that differences in the "clinical skills" of the teachers play a significant role in determining the success of individual students. It is not surprising that Benjamin Bloom (1984) should conclude that individual tutoring by an adult is the single most potent intervention that can be provided in education. While many explanations can be offered for why individual adult tutoring produces the largest improvement in achievement, one obvious possibility is that the individual adult, sensitive to the needs and differences of the student, is able to use continuous feedback from student performance to routinely modify instruction. In contrast, tests administered prior to the onset of the child's program can never produce the information required to tailor programs over the long run.

4. Finally, the formative evaluation model meets the needs of individual students because it is based on an idiographic approach that recognizes individual uniqueness, rather than a test based approach to individual differences that relies on group membership. Intrinsic to the traditional psychometric approach is that the scales used can sufficiently capture the important behavioral differences resulting from both genetic and environmental history that will interact with current environmental variation. The assumption is that a sufficient picture is captured in a single occasion snapshot of the individual, and that this picture contains all that is required for

understanding the relevant differences in that individual for instructional planning. The contrasting view that individual historical uniqueness in response to the current environment is much too complex for existing measurement technologies. The functional relations relevant to explaining and predicting a child's educational program at any moment are very likely stochastic. From a practical point of view, this means that not only are there too many variables controlling performance to be predicted by existing psychometric technology, but that the effects of those variables will change from moment to moment. In such a fluctuating situation, it seems to me that the only reasonable approach to providing for individual uniqueness is one that is idiographic. This will not always require tutoring, but it most certainly will require personal attention to each child's progress on a daily basis.

In Summary

The alternative model that I'm proposing here, then, is one that can be described as individually oriented, problem-solving that places primary emphasis on the professional skills of individuals. Those individuals must accept that the individual uniqueness of students will require use of performance data collected regularly across time to formatively evaluate the effectiveness of their problem solving efforts. This alternative approach to providing for individual difference is one that deemphasizes aptitude differences at the outset of a program and increases the emphasis on a methodology for tailoring programs to individual students during treatment. At the present time, we are overemphasizing the former at the expense of the latter. The importance of continually evaluating individual student programs

as a means of increasing program success for individual students cannot be overemphasized. To this point, I think a paraphrasing of Abraham Lincoln provides an appropriate conclusion:

> "A particular approach to instruction might work for all
> of the students some of the time,
> and it might work for some of the students all of the
> time,
> but no instructional approach will work for all of the
> students all of the time."

If we take seriously the notion of individual difference, we have no alternative but to continually monitor the effectiveness of our efforts and adjust our solutions to the individual case.

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Footnote

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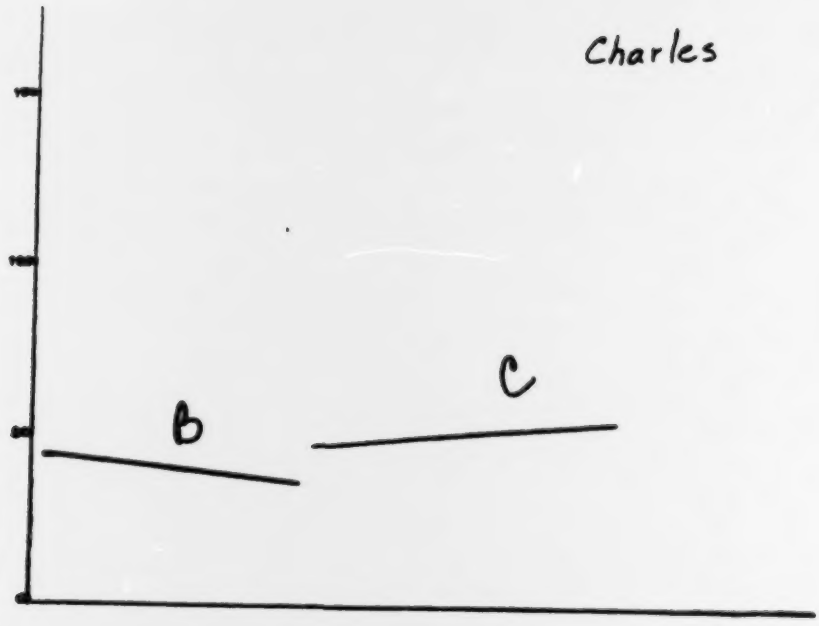

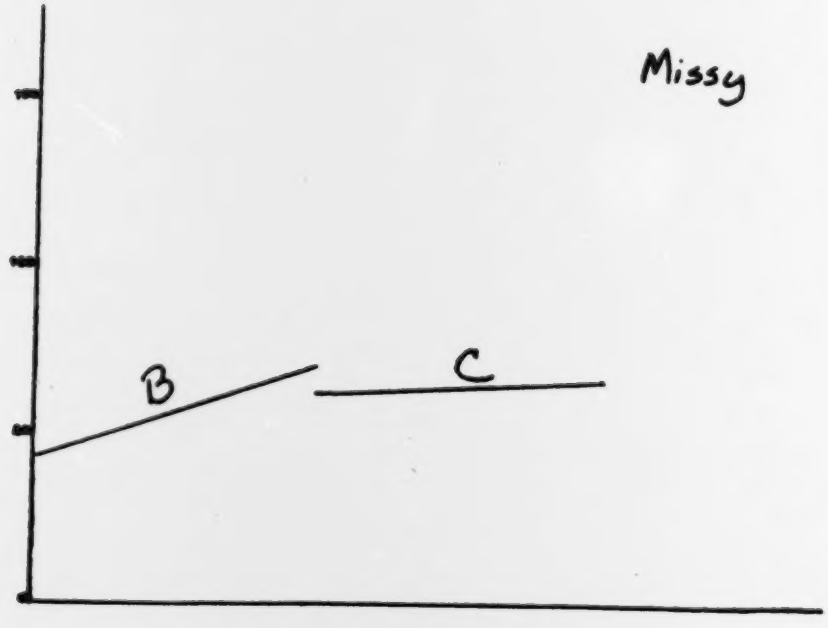

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FIGURE 1

	PHASE B	PHASE C		PHASE B	PHASE C
GROUP 1	HOLT WHOLE WORD	HOLT PHONICS	GROUP 5	CROSS-AGE TUTOR (PHONICS)	CROSS-AGE TUTOR (FREE READING)
GROUP 2	HOLT WHOLE WORD	MERRILL LINGUISTIC *	GROUP 6	INDIVIDUAL REINF.	GROUP REINF.
GROUP 3	LANGUAGE EXPERIENCE	TOKEN SYSTEM & ORAL READING	GROUP 7	PRECISION TEACHING W/O RATE BUILDING	PRECISION TEACHING WITH TOKEN SYSTEM
GROUP 4	HIGH INTEREST, LOW VOCAB (DOLCH WORDS)	LANGUAGE EXPERIENCE	GROUP 8	FREE CHOICE READING ACTIVITIES	LANGUAGE EXPERIENCE

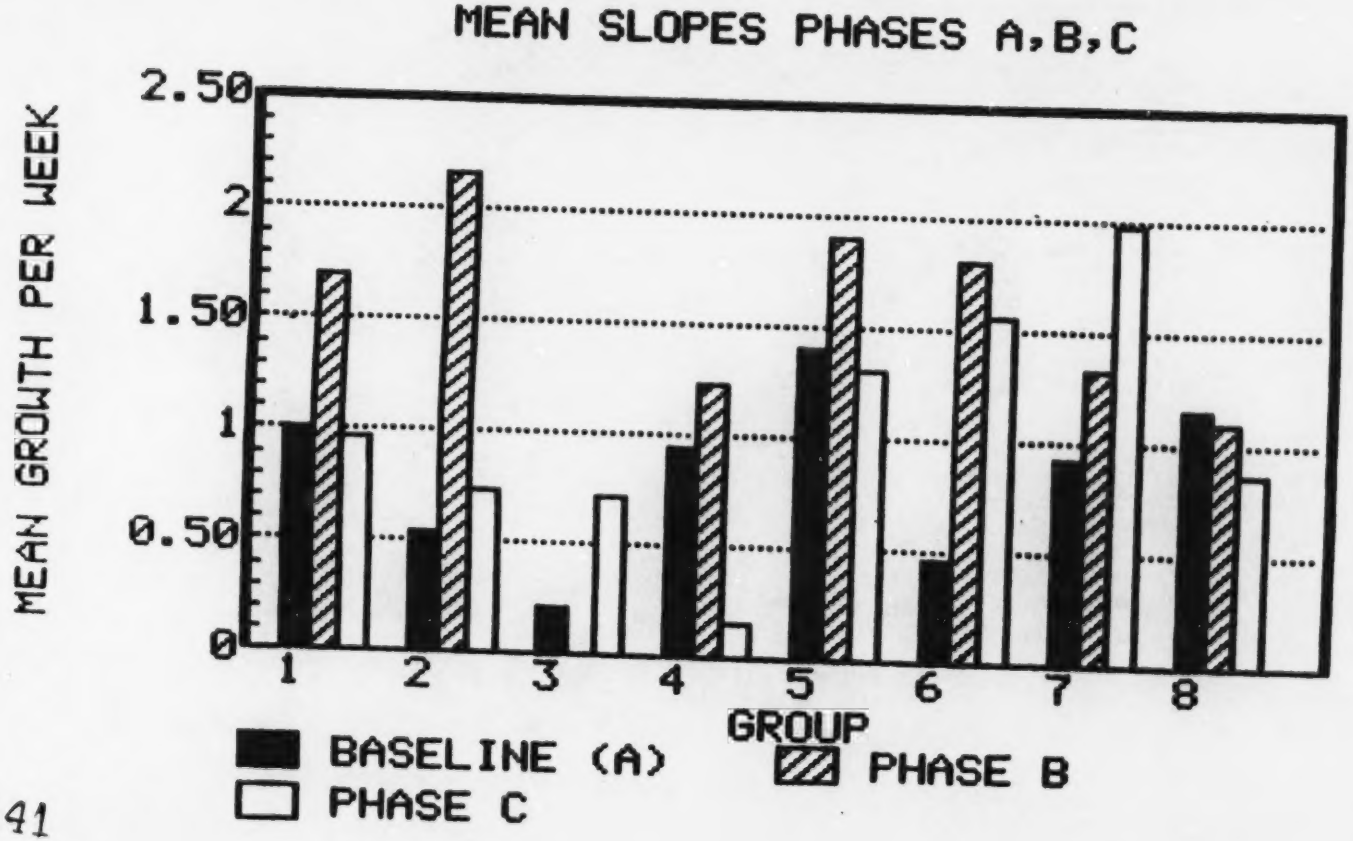

FIGURE 2

LANG EXP VS ORAL RD+TOKENS

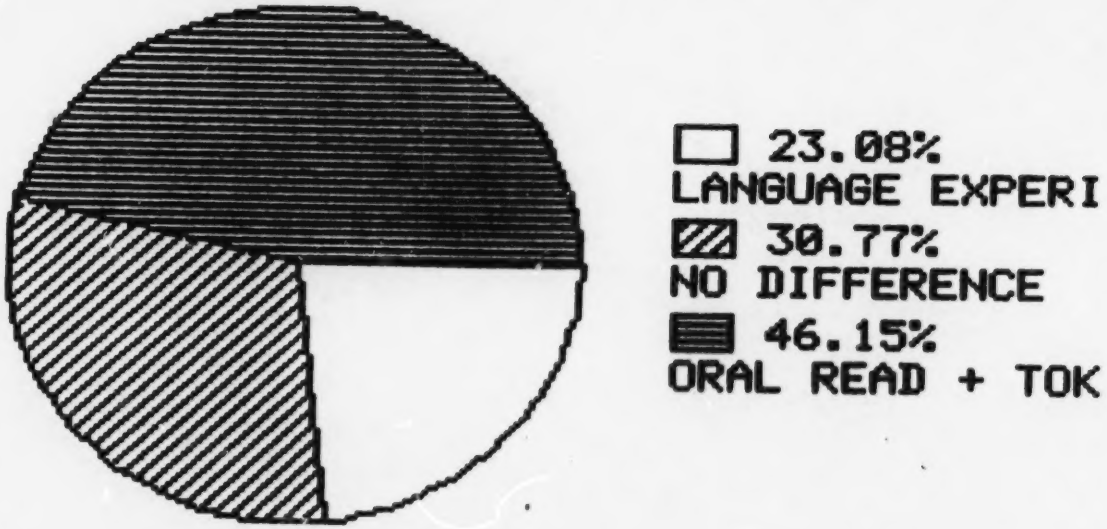

FIGURE 3

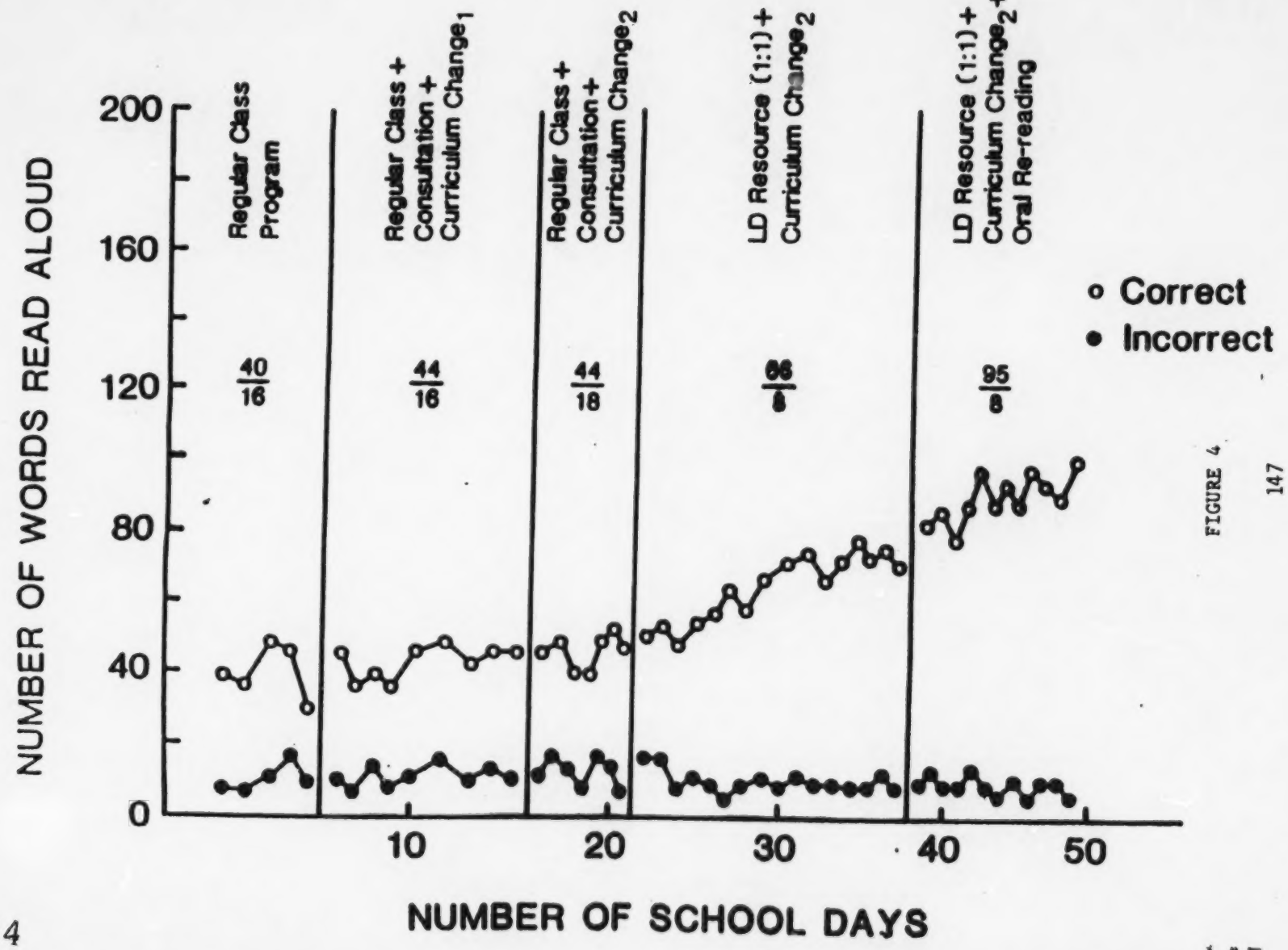
NUMBER OF WORDS READ ALOUD
200
160
120
80
40
0
10
20
30
40
50
NUMBER OF SCHOOL DAYS
Regular Class Program
Regular Class + Consultation + Curriculum Change1
Regular Class + Consultation + Curriculum Change2
LD Resource (1:1) + Curriculum Change2
LD Resource (1:1) + Curriculum Change2 + Oral Re-reading
40/16
44/16
44/18
66/8
95/8
Correct
Incorrect

FIGURE 4

APPENDIX: 1989 CONFERENCE AGENDA

DEPARTMENT OF INFORMATION SERVICES
THE COUNCIL FOR EXCEPTIONAL CHILDREN

THE ERIC CLEARINGHOUSE ON
HANDICAPPED AND GIFTED CHILDREN

AGENDA
1989 OSEP Research Project Directors' Conference
July 12-14, 1989
Ramada Renaissance Hotel
1143 New Hampshire Ave., N.W.
Washington, D.C. 20037

Wednesday, July 12

5:00 - 7:30	REGISTRATION AND CASH BAR [Renaissance 1]

Thursday, July 13

8:00 - 8:30	BREAKFAST AND REGISTRATION [Renaissance Foyer]
8:30 - 8:45	INTRODUCTION AND LOGISTICS [Renaissance 1 and 2]
8:45 - 9:45	GENERAL SESSION: The Integration of Multiple Methodologies in Examining a Research Question [Renaissance 1 and 2] Speaker: John B. Reid Oregon Social Learning Center Introduction: Marty Kaufman
9:45 - 10:15	QUESTIONS
10:15 - 10:30	BREAK

THE COUNCIL FOR EXCEPTIONAL CHILDREN OPERATES THE ERIC CLEARINGHOUSE ON HANDICAPPED AND GIFTED CHILDREN UNDER A CONTRACT WITH THE OFFICE OF EDUCATIONAL RESEARCH AND IMPROVEMENT, U.S. DEPARTMENT OF EDUCATION

1920 Association Drive, Reston, Virginia 22091 • (703) 620-3660

10:30 - 12:00 SMALL-GROUP DISCUSSION SESSIONS

Objective: Interaction among participants

The small-group sessions are intended to provide an opportunity for intellectual exchange within the field. They do not provide training or reports on specific projects. The questions that follow most of the session titles are intended to indicate the focus areas for those sessions. Participants should come to the sessions prepared to discuss those topics.

A1 Hypothesis Testing and Rejecting
(problems in reporting; the next research step)
Don McKinney [Foggy Bottom]

A2 Cost/Benefit Analysis: Value, Uses and Application
Robert Bruininks [Dupont]
(1. What are the practical values for administrators and researchers in the application of cost/benefit analysis in special education? 2. What steps must be followed in organizing and conducting a cost/benefit or cost-effectiveness study? 3. What major conceptual and methodological issues must be confronted in conducting cost/benefit and cost-effectiveness studies?)

A3 Strategies for Designing Interventions: Practical Considerations
Doug Carnine [Georgetown]
(1. Selecting subjects, e.g., finding subjects who are neither too skilled or too low-functioning. 2. Designing interventions, e.g., devising a comparison treatment. 3. Building measures, e.g., selecting a fixed-trials or trial-to-mastery design.)

A4 Self-Management Research: Improving Methodology
John Lloyd [Potomac]
(1. What are appropriate methods for documenting the implementation of independent variables in studies of self-management? 2. What classes of (or specific) dependent measures would facilitate the evaluation of the effects of self-management procedures? 3. What steps can we routinely take to help assess the contribution of subject characteristics to the effects of self-management procedures? 4. What are the theoretical issues in self-management that currently need to be addressed? 5. How can self-management packages be made sufficiently flexible to permit adaptation to the characteristics of individual participants but kept sufficiently prescriptive to permit replication?)

A5 Use of Technology for Instruction: Computer-Assisted Instruction (CAI) and Mildly Handicapped Learners.
Cynthia Okolo [Willow]
(1. Many of the earlier studies regarding the efficacy of CAI could be classified as media comparison research, in which one instructional mode (e.g., computer presentation) was compared to another instructional mode (e.g., teacher presentation). The limitations of media comparison research have been more widely recognized in the past five years. How could we characterize current approaches to studying the efficiacy of CAI and what are the limitations of these approaches? 2. Are there research questions regarding outcomes associated with CAI that are unique to computer-based instructional environments? Or are issues related to CAI use and efficacy merely a subset of broader research questions about the outcomes of curricular, instructional, and motivational interventions? 3. The literature regarding the outcomes associated with the use of CAI for mildly handicapped learners has been dominated by experimental or quasi-experimental studies. What other methodologies are appropriate for exploring these issues and how could they broaden the knowledge base?)

A6 Research Ethics
Jim Kauffman [New Hampshire 1]
(1. What features of special education research pose the greatest danger to subjects, and how are subjects best protected from these hazards? What are the major ethical issues in protection of consumers of special education research, and how might these be addressed by individual researchers? 2. What ethical problems arise in the synthesis and interpretation of a body of research literature in special education (i.e., what are the responsibilities of researchers and reviewers in accurately representing previous findings)? 3. How should researchers respond to funding competitions that they consider to be of questionable virtue (i.e., to requests driven by poorly developed or untenable assumptions regarding feasibility, generalizability, or probable outcome)?

A7 Longitudinal Research
Phil Strain [New Hampshire 2]
(1. What are the particular ethical issues that may arise in longitudinal research? 2. What methodological problems arise when the intervention itself is longitudinal? 3. What are the likely interpretation-of-effects problems with episodic data collection?)

A8 Fidelity of Treatment: Methods of Describing Interventions/Intervention Contexts (It's 6 Weeks Past Baseline--Do You Know What Your Treatment Is?)
Judith Carta [New Hampshire 3]
(1. Why don't we collect more information about our treatments/intervention contexts? 2. How does the experimental design employed in a study dictate the methodology chosen to measure fidelity of treatment? 3. What advantages are there to more precise measurement of interventions and intervention contexts? 4. What information do we (should we) collect and disseminate regarding the role of the researcher/developer as part of the intervention? What do we leave out?)

A9 Criteria for Determining Research Priorities: From Whose Point of View?
Robert Yin [Renaissance 1]
(1. Researcher? Methodologist? Administrator? 2. Can these views be optimized?)

A10 Randomization Tests in Single-Subject Research: The Utility of Randomization Tests in Analyzing Time-Series Data
Hyun Park [Renaissance 2]
(1. Should we use a statistical test in evaluating treatment effects? 2. What types of randomization tests are available? 3. What are the factors to be considered when using randomization tests?)

12:00 - 1:30 LUNCH (group lunch at the hotel)

[Renaissance 1 and 2]

Have lunch with a journal editor! A group of tables will be set aside for discussions with journal editors. Sign-up sheets will be available at the registration table.

1:30 - 3:00 SMALL-GROUP DISCUSSION SESSIONS

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B1 Methods of Describing Interventions/Intervention Contexts: Researcher as Intervention and Instrument
Catherine Morocco [Foggy Bottom]
(1. How does information about the context enhance intervention research? 2. When does the researcher become a part of the intervention model? 3. How does the researcher use his own role to observe and analyze the intervention process?)

B2 Family Issues: Measurement Issues in Studying Families
George Singer [Dupont]
(1. What should we measure? 2. What measures should we use? 3. How should we analyze the data? 4. Discussion will include: Multiple perspective modeling of family processes; and direct observation in natural settings.)

B3 Naturalistic and Ethnographic Methods: Considering Applications to Special Education
Janice Hanson [Georgetown]
(1. What criteria form the basis for effective evaluation of studies using naturalistic inquiry? 2. What issues do you see in relation to integrating qualitative and quantitative approaches to research? 3. What gaps in special education research or knowledge do you see that could be approached effectively using naturalistic inquiry?)

B4 Issues in Secondary Education: Longitudinal Designs with Mildly Handicapped Students
Donald MacMillan [Potomac]
(1. What are the appropriate comparison groups for assessing the effects of repeated testing? 2. What problems are encountered in defining mildly handicapped and non-handicapped cohorts (e.g., 9th graders)? 3. How does one select outcome measures which have curricular validity for students served in Resource Specialist and Special Day Class settings?)

B5 Transition Issues
Frank Rusch [Willow]

B6 External Validity and Replication: Studying Innovation and the Change Process
Russell Gersten [New Hampshire 1]
(1. How can the most critical components of an innovation be defined for purposes of research? 2. What are the best ways to measure implementation? What are the benefits and drawbacks associated with various approaches [teacher report vs. direct observation vs. rating, model-specific vs. generic]? 3. What lessons have been learned--or can be learned--from studies of how teachers adapt innovations, studies of teachers' perceptions, and studies of the change process?)

B7 Social Validity: Applied Significance of Research in Special Education
Charles Greenwood [New Hampshire 2]
(1. Current conceptual issues. 2. Types of measures. 3. Integration of social validity measures into research design.)

B8 Standards and Strategies in Publications
Doug Fuchs [Renaissance 2]
(1. How can we resolve the tension between rigorous research reporting and reaching practitioners? 2. Are there methodologies that do not get a fair hearing in the journals, and if so, why? 3. How do you select the right journal in which to disseminate your research?)

B9 Considerations in the Use of Low- vs. High-Inference Measures: Designing Observational Protocols for Special Education Research
Naomi Zigmond [Renaissance 1]
(1. What are the advantages and disadvantages of high-inference and low-inference observational variables? 2. Are there standards for reliablility with low-inference data? 3. Are observation protocols designed for one study usable in subsequent research?)

B10 Sequential Analysis: A Non-Statistical Interpretation
Alan Repp [New Hampshire 3]
(1. Is there a way to collect data on portable computers suitable for sequential analysis? 2. What does a sequential analysis tell us about these data? 3. What else can these data tell us?)

3:00 - 3:15 BREAK

3:15 - 4:15 PANEL DISCUSSION: Exploring the Importance of Individual Differences in Special Education

[Renaissance 1 and 2]

Moderator: Lynn Fuchs

Panelists (20 mins. each)

Alan Hofmeister
Debbie Speece
Stan Deno

Reactor: Rick Brinker

4:15 - 5:00 QUESTIONS

5:00 - 7:00 CASH BAR [New Hampshire 1 and 2]

Friday, July 14

8:00 - 8:30 BREAKFAST [Renaissance Foyer]

8:30 - 9:30 GENERAL SESSION: Methodologies to Extract Meaning vs. Relationships

[Renaissance 1 and 2]

Speaker: Evelyn Jacob
George Mason University

Introduction: Robert Gaylord-Ross

9:30 - 10:00 QUESTIONS

10:00 - 10:15 BREAK

10:15 - 12:00 SMALL-GROUP DISCUSSION SESSIONS

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C1 Naturalistic and Ethnographic Methods: The False Dichotomy of Quality and Quantity?
Sam Odom [Foggy Bottom]
(1. Is there a place for inductive research in special education? 2. What are the data for this type of research, and how does one capture it? 3. Are the traditional concepts of reliability and validity relevant for naturalistic/ethnographic research?)

C2 Social Validity: Applied Significance of Research in Special Education
Debra Whorton Kamps [Dupont]
(1. Current conceptual issues. 2. Types of measures. 3. Integration of social validity measures into research design.)

C3 Considerations in the Use of Low- vs. High-Inference Measures: Going from Data to What They Mean
Jim Ysseldyke [Georgetown]
(1. How direct must we be in measuring behavior and still be able to make reasonable inferences? 2. How do researchers maintain freedom to speculate without letting people misuse data?)

C4 Competition Area--SED: Understanding the Context of Troubling Behavior
Peter Leone [Potomac]
(1. The influence of interpersonal ecology on student behavior. 2. Squeezing meaning from empirical investigations: alternative methods and paradigms for examining disordered behavior. 3. The impact of troublesome behavior on peer relationships.)

C5 Competition Area--Early Intervention: Producing an Empirical Foundation for Practice
Richard Brinker [Willow]
(1. What models and techniques are being used to test the implementation of early interventions? 2. How can the effects of various forms of family involvement in the early intervention process be tested and what dependent measures are being utilized? 3. What changes in early intervention systems are occurring as a function of P.L. 99-457 and are these changes related to patterns of state agency leadership?)

C6 Competition Areas--Interventions for Mildly Handicapped/Comprehensive Models/Teaching and Learning
Jerome Freiberg [New Hampshire 1]
(1. Continuance of effective programs beyond funding. 2. Relationship between competitive grant outcomes and at-risk students. 3. Issues of replication of effective studies. 4. Validity of classroom observation.)

C7 Competition Area--Social Support: Measurement and Assistance Procedures

Robert Horner [New Hampshire 2]

(1. What strategies exist for measuring "social support" and "social networks" for people with more severe disabilities? 2. What procedures exist for providing assistance in building and maintaining social support systems? 3. What is our current knowledge base concerning the status of social support and social networks for adolescents and adults with disabilities?)

C8 Competition Area--Translating Research into Practice: Issues Surrounding the Design of Classroom-Based Research

Margo Mastropieri [New Hampshire 3]

(1. What are the internal/external validity trade-offs in conducting classroom-based research? Or, what types of sacrifices are permissible in conducting classroom-based research as opposed to laboratory research? 2. Discuss viable research designs. Do some research questions or target populations preclude the use of some designs? 3. Discuss procedures for handling some of the following potential problems associated with classroom-based research: (a) attrition; (b) non-independence of samples; (c) unit of analysis; (d) teacher effects; (e) classroom effects; (f) school effects; and (g) spontaneous transfer or generalization effects.)

C9 Competition Area--Language Research: Current Issues in Intervention

Ann Kaiser [Renaissance 1]

(1. What are the pressing methodological and design issues in language research, and how have these been addressed in single-subject and group design research? 2. What has research suggested regarding differential efficacy of various treatments for children with different ability levels, ages, and/or learning characteristics? 3. What are the factors related to implementation that should be researched as part of the process of translating treatments shown to be effective in empirical studies into practice?)

C10 Competion Area--Social Skills

Robert Gaylord-Ross [Renaissance 2]

(1. Are we able to identify a set of empirically validated procedures which are able to induce the development of social skills among disabled students? 2. Have the results of social skills training been limited to artificial contexts; or have there been instances of more widespread generalization to more natural settings? What are some promising methods to

provide generalization? 3. What are the most veridical measurement approaches for documenting the development of social skills?)

12:00 - 1:30 LUNCH (on your own)

The Conference Planning Committee will meet the student researchers for lunch.

1:30 - 2:30 GENERAL SESSION: View From OSERS

[Renaissance 1 and 2]

Speaker: Martin J. Kaufman, Director
Division of Innovation and Development
Office of Special Education Programs

2:30 - 3:00 QUESTIONS

3:00 - CLOSING